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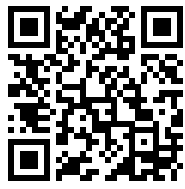

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VOLUME X

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UNIVERSITY STUDIES

VOL. X JANUARY 1910 NO. 1

THE IMAGINARY IN GEOMETRY[1]

BY ELLERY W. DAVIS

Let the point $\tilde{P}$ with complex coördinates

$$\tilde{x} \equiv x' + ix'', \quad \tilde{y} \equiv y' + iy''$$

be represented by a "red vector" joining the ordinary "black point" $(x', y') \equiv P'$ to the "blue point"

$$(x' + x'', y' + y'') \equiv P''.$$

We may conceive the blue point as in a plane of imaginaries in which the origin of coördinates is over (x', y'). Similarly, Maxwell has superposed a velocity diagram upon a position diagram, and upon that an acceleration diagram. It will sometimes be convenient to speak of a "black-vector" from the origin to the black-point from which the red vector begins. Though the vector is understood to be always straight the line which represents it may for convenience be drawn curved. It is essential merely that it go from the proper beginning to the proper end.

2. The coördinates are merely the projections of the vector upon the axes. We can change to new axes rectangular or oblique, leaving the red vector unchanged. We can make the coordinates homogeneous. We can extend the method to space coördinates. All the usual formulæ for transformation will hold,

[1] Portions of this paper have been read as follows: Before the American Mathematical Society, Chicago, April, 1907; Ithaca, November, 1907; Columbia, November, 1909; and before the British Association for the Advancement of Science, August, 1909.

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since they held for the real joints (x', y') and $(x'+x'', y'+y'')$. We do not here consider imaginary axes.

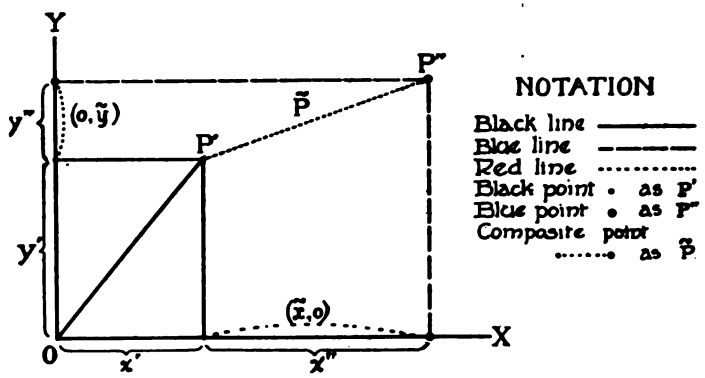

FIG. 1.

3. The addition of real quantities to the coördinates shifts the red vector without changing its length or direction, but not so with the addition of a complex quantity.

In fact, the change is a double-vector addition, the black vector of $(\tilde{x}+\tilde{x}_1, \tilde{y}+\tilde{y}_1) \equiv P_2$ being the vector sum of the black vectors of $(\tilde{x}, \tilde{y}) \equiv \tilde{P}$ and $(\tilde{x}_1, \tilde{y}_1) \equiv P_1$, while the red vector of

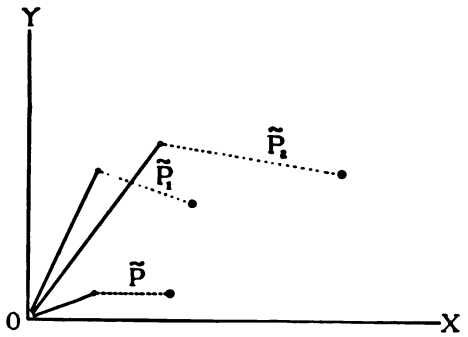

FIG. 2.

the sum is similarly the sum of the red vector of the summands (see fig. 2).

4. The multiplication of both coördinates by real numbers mul-

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tiplies both black and red vectors by the same real number without changing any direction. It is a simple magnification (fig. 3).

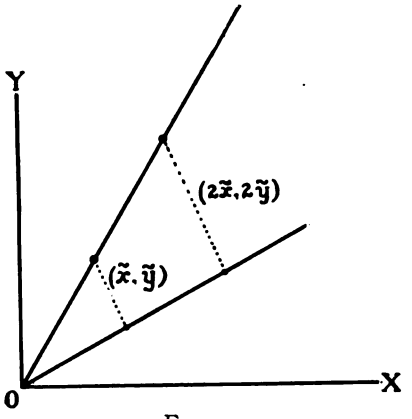

FIG. 3.

The multiplication by a complex number is more complicated. Consider, therefore, first the multiplication of $(1, i)$ by

$$e^{i\theta} \equiv \cos\theta + i\sin\theta.$$

The product is $(\cos\theta + i\sin\theta, i\cos\theta - \sin\theta)$. An inspection of fig. 4 shows that this is merely the double vector of $(1, i)$

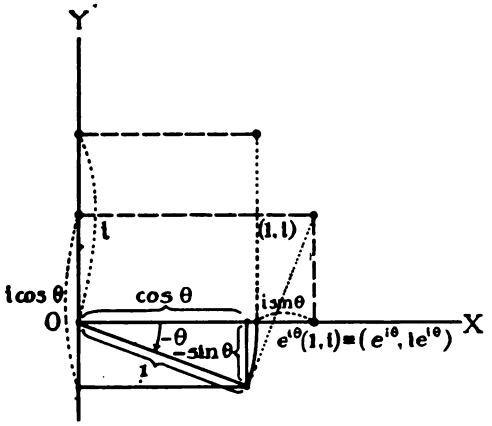

FIG. 4.

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turned backward through an angle θ. As θ varies the black point moves on a circle of radius unity while the blue point moves on one of radius $\sqrt{2}$. The red vector is constantly tangent to the inner circle. Had the multiplicand been $(1, -i)$ the same multiplier would have caused a turn forward through an angle θ. Had the multiplicand been (a, bi) the figure representing the change would have been simply a parallel projection of figure 4. As θ varied the black point would have moved on the ellipse

$$x^2/a^2 + y^2/b^2 = 1,$$

while the blue point moved on

$$x^2/a^2 + y^2/b^2 = 2,$$

the red vector keeping tangent to the inner ellipse. The area swept over by the black vector would have to the area of the ellipse the ratio $\theta : 2\pi$, *i. e.*, the area would be $\theta ab/2$. In this more general case, in every position as θ varies from 0 to 2π, the black vector is a semi-diameter of the inner ellipse, while the red vector is parallel and equal to the semi-conjugate diameter. Thus, finally, given any double vector, multiplication by $c^{i\theta}$ will move the black point on an ellipse of which the black vector is a semi-axis, while the red vector is parallel and equal to the semi-conjugate axis. The red vector will keep tangent to this ellipse, while the black vector sweeps over an area equal to θ times that of the triangle origin, black point, blue point. The motion will always be such that the red vector is momentarily carried in a direction opposite to that in which we have conceived it to point (fig. 5). Multiplication by $rc^{i\theta}$, where r is real, combines with the above a simple magnification.

It is necessary to notice some exceptional cases.

Suppose that the black vector is collinear with the red. Take for x-axis the common line and for y-axis the perpendicular thereto. The double vector is then $x' + ix'' = r(\cos\phi + i\sin\phi)$. There are, of course, an infinite number of double vectors having this for the x-projection. Among them is one whose y-projection is $y' + iy'' = -x'' + ix' = r(-\sin\phi + i\cos\phi)$. Thus $x' + ix''$

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is the x-projection of $(1, i)re^{i\phi}$ When $(1, i)re^{i\phi}$ gets multiplied by $\cos\theta + i\sin\theta$ all parallel projections are so multiplied. Thus $(x' + ix'')e^{i\theta}$ is the x-projection of $(1, i)re^{i(\phi+\theta)}$. If θ varies

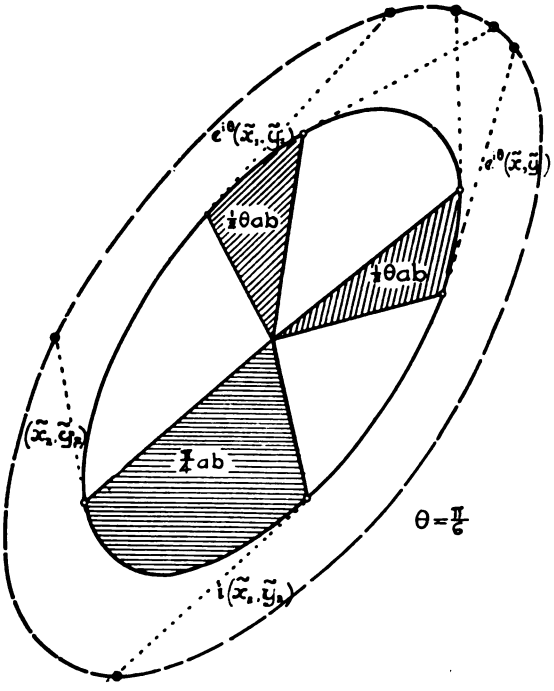

FIG. 5.

uniformly the ends of the red vector of $x' + ix''$ execute simple harmonic motions of amplitudes

$$2\sqrt{x'^2 + x''^2} \text{ and } 2\sqrt{2}(x'^2 + x''^2),$$

the phases differing by $\pi/8$. When $\theta = -\phi$ or $\pi - \phi$, the product $(x' + ix'')e^{i\theta}$ is wholly real; when $\theta = \pi/2 - \phi$ or $3\pi/2 - \phi$ the product is wholly imaginary. Thus the cases of the multiplicand wholly real or wholly imaginary can be treated as sub-cases under what we are now considering.

Suppose that the black vector is finite while the red is infinite. Then, when we multiply by $e^{i\theta}$, the projection, parallel to the red

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vector and upon the black, of the change in the double vector is precisely such a double harmonic motion as we have been describing, the amplitudes being 2 and $2\sqrt{2}$ times the black vector. The projection, parallel to the black vector and upon the red, of this same change is discontinuous, being infinite for a finite variation in θ. While θ varies from 0 to π/a the blue point remains at infinity in the direction of the original red vector. As θ passes π/a the blue point flies from infinity in that direction to infinity in the opposite direction, whither the black point went at the start. Fig. 6 is supposed to represent the facts when $\theta = 0$

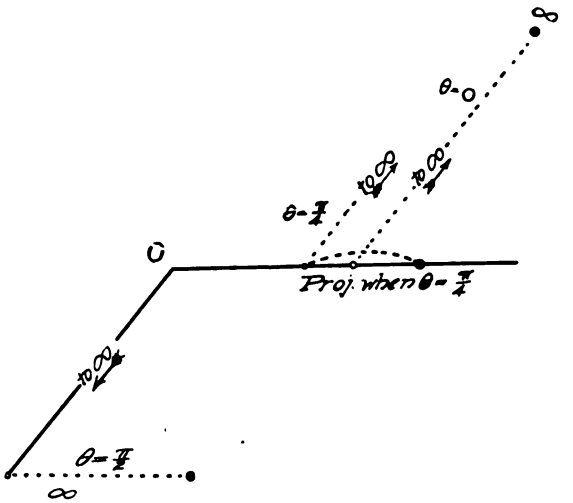

FIG. 6.

and when θ is passing π/a. The dotted line midway between the infinite vectors is the projector of the black point. Both the black point and the blue point stay at infinity until θ passes π, when the black flies from ∞ through the finite position, symmetrical to its original position with respect to O, on to infinity in the opposite direction. Thither also the blue point flies when θ passes $3\pi/2$.

When both parts of the double vector are infinite, neither the blue point nor the black will ever come into the finite field. If

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the θ of the multiplier vary at a finite rate, the projections, upon any line in the finite region, of the end points of the red vector will now one and now the other fly by with infinite velocity.

We shall usually have no occasion to speak of the black vector, for the red vector and the set of complex coördinates are in one-to-one correspondence.

The Linear Relation

When in the equation of the straight line with real coefficients one of the coördinates is complex, the other will usually also be complex. For example,

$$\tilde{y} = m\tilde{x} + b,$$

breaks into

$$y' = mx' + b \quad \text{and} \quad y'' = mx''.$$

Then the red vectors join any point whatever of the line, say P', to any other point P''. In particular if

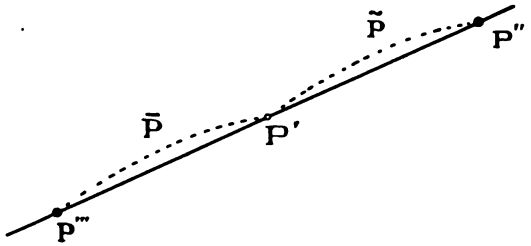

Fig. 7.

$$(\tilde{x},\ \tilde{y}) \equiv (x' + ix'',\ y' + iy'') \equiv \tilde{P},$$

is on the line, so also is the conjugate element,[1]

$$(\bar{x},\ \bar{y}) \equiv (x' - ix'',\ y' - iy'') \equiv \bar{P},$$

and is represented by a red vector from

$$(x',\ y') \text{ to } (x' - x'',\ y' - y'') \equiv P'''.$$

Conversely, two conjugate vectors $(\tilde{x},\ \tilde{y})$, $(\bar{x},\ \bar{y})$ determine a

[1] Element of a locus will be used to mean that whose coordinates satisfy the equation of the locus.

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line their *bearer* the line, namely, through (x', y') with slope y''/x''.

Among the elements of a real line are an infinite number whose imaginary parts are zero. These are the only ones of which we habitually think.

Scarcely more complicated is the line whose slope is real but whose intercept is complex. Let its equation be

$$\tilde{y} = m\tilde{x} + \tilde{b}.$$

This breaks into

$$y' = mx' + b' \quad \text{and} \quad y'' = mx'' + b'',$$

so that the red vectors join any point on the black line to any point whatsoever on the blue line. The line has no real element

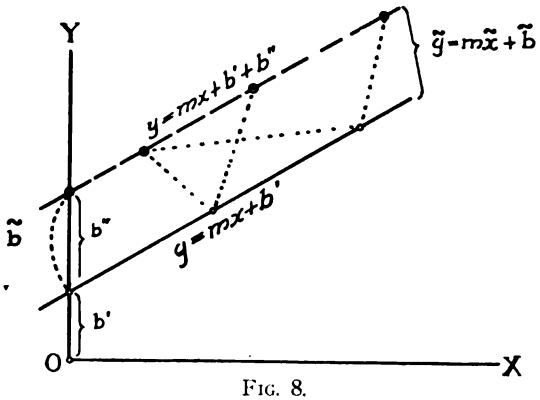

Fig. 8.

in the finite region. Moreover, if a vector be an element, the conjugate vector is not.

Plainly, if the line joining the black points of two red vectors is parallel to that joining the blue points, then the vectors belong to one and the same line of real slope. In particular, two red vectors that agree in their black points or in their blue points belong to such a line.

When blue line coincides with black we get an ordinary real line.

Consider the more general case where $(\tilde{x}_1, \tilde{y}_1)$, $(\tilde{x}_2, \tilde{y}_2)$, call

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them $\tilde{P}_1$ and $\tilde{P}_2$ do not belong to a line of real slope. Let the equation of the line be

$$\tilde{a}\tilde{x} + \tilde{b}\tilde{y} = 1.$$

In this equation, since the line does not have a real slope, we must have

$$\begin{vmatrix} a', & a'' \\ b', & b'' \end{vmatrix} = 0.$$

We say that $\tilde{a}$ and $\tilde{b}$ must not be similar complex quantities.

Since the given vectors satisfy the equation so also does $\tilde{P}_3$ given by

$$(\tilde{p}\tilde{x}_1 + q\tilde{x}_2,\ \tilde{p}\tilde{y}_1 + q\tilde{y}_2), \quad \text{where } p + q = 1.$$

If p and q are real the blue point P_3'' is on the line joining the blue points of P_1'' and P_2'', while the black point P_3' is on the

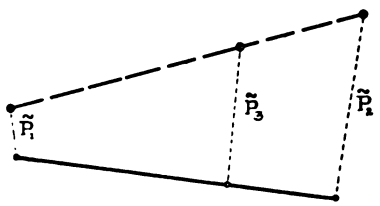

FIG. 9.

line joining the black points P_1' and P_2'. In fact, as p varies from 1 to 0 to ∞ to $-\infty$ to 1 again, the black point describes a black line and the blue point a corresponding blue line, so as always to keep the segment of these lines included between the vectors $\tilde{P}_1$ and $\tilde{P}_2$ divided in the ratio[1] $q : p$. We can say that the double segment of the line $\tilde{P}_1\ \tilde{P}_2$ is divided in the ratio $q : p$.

Suppose, however, that the ratio in which we divide the line is complex $\tilde{q} : \tilde{p}$. We can so take $\tilde{p}$ and $\tilde{q}$ that $\tilde{p} + \tilde{q} = 1$ and therefore $p' + q' = 1$ and $p'' + q'' = 0$. The division will then be found connected with that in the ratios of $q' : p'$ and $q' + q'' :$

[1] The row of blue points is projective to the row of black ones, but in addition the infinite points of the rows are corresponding. Thus the rows are similar.

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$p' + p''$. These divisions are represented in fig. 10 by $\tilde{P}_3$ and $\tilde{P}_4$ respectively. Reflect that the black line-segment represents

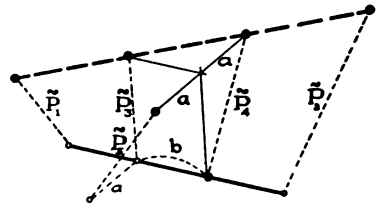

FIG. 10.

the growth in the black vector, as keeping real, *i. e.*, black, it changes from the black vector of $\tilde{P}_1$ to that of $\tilde{P}_2$, while the blue line-segment represents the corresponding growth in the double-vector, the sum of the growths of the constituent vectors.

When instead of division in the ratio of $q' + q'' : p' + p''$ we have that in the ratio $\tilde{q} : \tilde{p}$ each of these growths is divided in that ratio. Thus, instead of the black growth from $\tilde{P}_3$ to $\tilde{P}_4$ we have a red-growth which will therefore change the red vector, while instead of the red change in the vector from that of $\tilde{P}_3$ to that of $\tilde{P}_4$ we shall have an opposite black change. The resultant red vector is $\tilde{P}_5$. In the figure the vectors marked a are each equal to $\tilde{P}_3 - \tilde{P}_4$ while $\tilde{P}_5$ is equal to $\tilde{P}_3 + b$.

Any point in the plane is the black end of a red vector dividing the line connecting two vectors in some ratio or other. For let the vectors be $\tilde{P}_1$, $\tilde{P}_2$. Join their black points by a black line

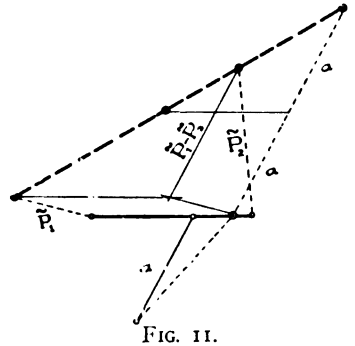

FIG. 11.

and their blue points by a blue line, and from the arbitrary point in the plane draw a black vector in the direction $\tilde{P}_1 - \tilde{P}_2$, or its

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opposite, until the black line $P_1' P_2'$ is met. Divide the blue line $P_1'' P_2''$ in the same ratio as the black line is thus divided. From the point of division of the blue line draw a parallel to the black to a point such that a black vector from it equal to that from the arbitrary point will just reach the blue line. This vector reversed will give the blue point that goes with the arbitrary black point to determine the red vector required. Fig. 11 illustrates this construction. Similarly, we can start with any point in the plane for a blue point.

Return to the equation $\tilde{a}\tilde{x} + \tilde{b}\tilde{y} = 1$. This is equivalent to the pair

$$a'x' + b'y' - a''x'' - b''y'' = 1,$$
$$a'x'' + b'y'' + a''x' + b''y' = 0.$$

These show very plainly that there is a one-to-one correspondence between black points and blue points, provided

$$\begin{vmatrix} a', & b' \\ a'', & b'' \end{vmatrix} \neq 0.$$

In particular, let $x'' = y'' = 0$, so that the blue point coincides with the black. This will give a point $(x_0, y_0) \equiv P_0$, whose red vector vanishes. We get, in fact,

$$x_0 = \frac{b''}{a'b'' - a''b'}, \quad y_0 = \frac{-a''}{a'b'' - a''b'}.$$

When the denominator vanishes, but at least one numerator does not, P_0 goes to infinity. We have in fact the case of a line of real slope. If a'' and b'' both vanish the line is real and P_0 is indeterminately any point whatever on the line. Note in these cases, that, although $x'' = y'' = 0$ gives the point P_0 with coördinates as above, yet to assume coördinates as above for a black point leaves the blue point to go with it indeterminate.

The point P_0 we call the center of the line. When it goes to infinity or becomes indeterminate we say that the line is *non-central.*

Given two red vectors $\tilde{P}_1$ and $\tilde{P}_2$ (fig. 12) to construct the center P_0 of the line to which they belong, proceed as follows: Draw the black line and the blue line joining them. The vector

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$\tilde{P}_3$ belonging to the line $\tilde{P}_1\,\tilde{P}_2$ whose blue point is at the crossing of blue line and black line has its black point on the black line at the distance l equal to the projection parallel to $\tilde{P}_1\,\tilde{P}_2$ of $\tilde{P}_1$ and $\tilde{P}_2$ upon the black line. Moreover, this point bisects the

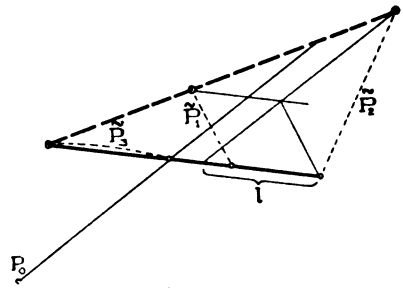

FIG. 12.

line drawn from the center P_0 we seek and terminated by the blue line.

Fig. 13 illustrates how given the center P_0 and a red vector $\tilde{P}_1$ we can construct other vectors $\tilde{P}_2$ and $\tilde{P}_3$.

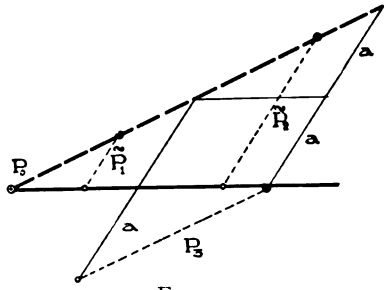

FIG. 13.

To see more clearly and comprehensively the character of the central line consider the special line

$$\tilde{y} = i\tilde{x},$$

whose center is the origin.

At once

$$y' = -x'' \quad \text{and} \quad y'' = x'.$$

Hence the red vector is at right angles to the black vector from

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the origin and has the same length. If the red vector be taken for a velocity then the equation represents a rotation of the entire

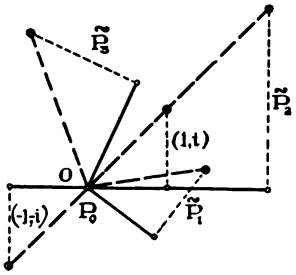

FIG. 14.

plane about the origin as center at the angular rate positive unity. When $\tilde{y}=i\tilde{x}$ then $\bar{y}=-i\bar{x}$, so that the conjugate vector belongs to the conjugate line $\tilde{y}=-i\tilde{x}$.

The lines

$$(\tilde{y}-b)=i(\tilde{x}-a) \text{ and } (\tilde{y}-b)=-i(\tilde{x}-a),$$

also conjugate, differ from the foregoing only in having their center at (a, b). The pair together form the point circle

$$(\tilde{x}-a)^2+(\tilde{y}-b)^2=0.$$

All such pairs of lines cut the line at infinity[1] in the same two "circular vectors at infinity." We call each line a "circular ray." Moreover we denote the vector at infinity when the slope is $+i$ by $\tilde{I}$, when $-i$ by $\tilde{J}$.

Every other central line is elliptic, is a parallel projection of a circular ray.

It suffices to prove this for

$$\tilde{y}=re^{i\phi}\tilde{x}.$$

If we multiply both sides of the equation by $e^{i\theta}$ it remains satisfied, *i. e.*, $e^{i\theta}(\tilde{x}, \tilde{y})$ satisfies the equation if $(\tilde{x}, \tilde{y})$ does. But we have already seen that the red vector $e^{i\theta}(\tilde{x}, \tilde{y})$ is tangent to the same ellipse that $(\tilde{x}, \tilde{y})$ is and that its blue point is on the

[1] To fix the ideas we think of $x=\infty$ as the line at infinity.

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same coaxial and similar blue ellipse. All the red vectors belonging to the line have the like relation to a pair of ellipses coaxial and similar to these. The motion set up is elliptic and

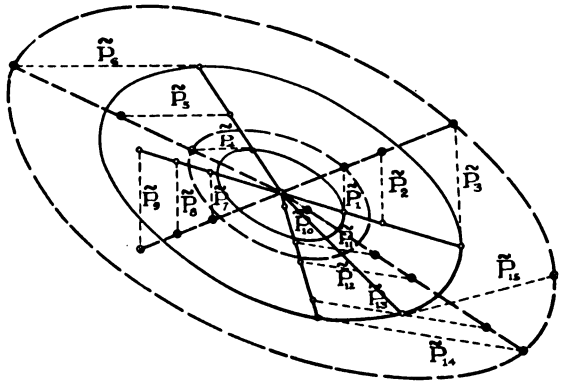

FIG. 15.

compounded of simple harmonic motions parallel to conjugate diameters of the ellipses; that is, parallel to a red vector and the corresponding black vector from the center of the line (see Fig. 15). For all values of a and b

$$\tilde{y} - b = re^{i\phi}(\tilde{x} - a)$$

has the same elliptic vector at infinity. The conjugate line

$$\tilde{y} - b = re^{-i\phi}(\tilde{x} - a)$$

has its vectors tangent to the same ellipses. The pair together give the point ellipse

$$\tilde{y} - b + (\tilde{x} - a)\cos\phi)^2 + r^2(x - a)^2 \sin^2\phi = 0;$$

for the two can be written

$$(\tilde{y} - b) - r(\tilde{x} - a)\cos\phi = ir(x - a)\sin\phi,$$

$$(\tilde{y} - b) - r(\tilde{x} - a)\cos\phi = -ir(x - a)\sin\phi.$$

We now perceive that to multiply the coördinates of a red vec-

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tor, as of an ordinary point, is merely to move it so that it always remains upon the line determined by itself and the origin.

It is interesting to observe how a line of imaginary slope passes over into one of real slope as the center moves out to infinity. For example, consider

$$y = \frac{i}{k}(x + k)$$

approaching

$$y = i,$$

as k becomes infinite.

For all values of k the vector $(0, i)$ belongs to the line. This vector is tangent to the ellipse

$$\frac{(x+k)^2}{k^2} + y^2 = 1,$$

and has its blue point on

$$\frac{(x+k)^2}{k^2} + y^2 = 2.$$

Moreover, all vectors drawn from tangency to the first ellipse and terminated by the second belong to the line or its conjugate.

Indeed, all vectors belonging to the line are drawn from tangency to some ellipse

$$\frac{(x+k)^2}{k^2} + y^2 = \left(1 + \frac{l}{k}\right)^2$$

with axes $k + l$ and $1 + k/l$, and terminated by

$$\frac{(x+k)^2}{k^2} + y^2 = 2\left(1 + \frac{l}{k}\right)^2$$

with axes $(k + l)\sqrt{2}$ and $\left(1 + \frac{k}{l}\right)\sqrt{2}$.

Among these is the vector $\left[l, i\left(1 + \frac{l}{k}\right)\right]$. Thus for all values of k and of l the vector $\left[l, i\left(1 + \frac{l}{k}\right)\right]$ belongs to the line. As k becomes large this becomes more and more nearly (l, i) which belongs to $y = i$.

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The most general vector belonging to $y=i$ is $(l+mi,\ i)$.

This also, for k large, nearly satisfies $y=\frac{i}{k}(x+k)$, since $x=l+mi$ gives

$$y=\frac{i}{k}(l+mi+k)=i\left(1+\frac{l}{k}\right)-\frac{m}{k}.$$

The black ellipse having a major axis k and a minor axes $1+l/k$ at a distance k from the origin coincides in the finite

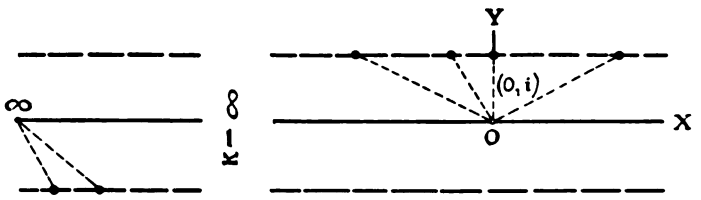

FIG. 16.

region as k gets large, with the x-axes, while the blue ellipse coincides with the lines $y^2=1$. The tangents to the black ellipse in the finite region are all drawn from the vertex at $(l,\ o)$ and are terminated by $y=1$. The tangent vectors from the vertex $(-ik-l,\ 0)$ would be terminated by $y=-1$ but would either lie wholly at infinity or be nearly coincident with the x-axis.

There are other ways of representing the imaginary element. For example, a vector from the real point on the circular ray through the element and $\tilde{J}$ to the real point on the circular ray through the element and $\tilde{I}$. This method is due to Cauchy, and has been used by LaGuerre and others. Thus the imaginary element $\tilde{P}$ (fig. 17) on the line AB is represented by the arrow at right angles to the red vector $(\tilde{x},\ \tilde{y})$ of twice the length of that vector, and bisected by that vector. The conjugate element would be represented by the arrow reversed, that is from the real point on the I-ray to the real point on the J-ray. Since every point in the plane is the center of an I-ray and since that I-ray has the same red vector along AB that the J-ray with its center at the symmetric point has, therefore every point in the plane receives

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the barb of one and only one arrow representing an imaginary element of AB. Thus, knowing that the element belongs to AB, we represent it perfectly by the point. If coördinates be rect-

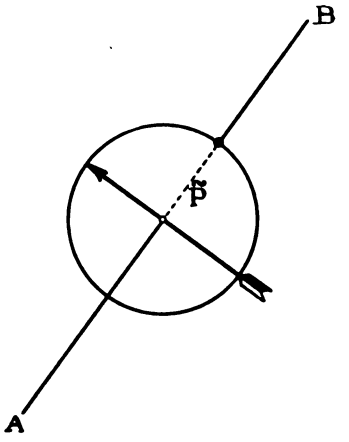

FIG. 17.

angular, the centers of the I-line and the J-line through $(\tilde{x}, \tilde{y})$, the barb and the butt of the arrow, are respectively

$$(x' - y'', \; y' + x'') \quad \text{and} \quad (x' + y'', \; y' - x'').$$

Applying the ordinary formula to the distance between two points in the plane to $\tilde{P}, \tilde{P}_1$ we get

$$\tilde{d}^2 = (\tilde{x}_1 - \tilde{x})^2 + (\tilde{y}_1 - \tilde{y})^2.$$

Working this out it will be found that

$$\tilde{d}^2 = l_1 l_2 e^{i\phi},$$

where l_1 is the length of the line joining the buts of the arrows, l_2 the length of the line joining the barbs and ϕ the angle described by turning positively from the direction l_1 to the direction l_2.[1]

Since the arrows for an I-ray all have their barbs at the center

[1] LaGuerre, Oevres, II, 97.

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of the ray, the distance between the elements represented is zero. Similarly, the distance between any two elements of a J-ray is zero.[1] If an I-ray and a J-ray have the same center, we have the paradox that although no element of either has any distance from the center, yet the distance of an element of one ray from an element of the other is the square root of the product of the arrow lengths for the elements into the exponential of i times half the angle between them.

A very simple construction can be given for the distance from the origin of (x', iy''), axes being rectangular. Fig. 18 represents the cases

$$|y_1''| < |x'|, \; |y_2''| = |x'|, \; |y_3''| > |x'|.$$

Here

$$l_1 = |x' + y''|, \; l_2 = |x' - y''| \quad \text{and} \quad \phi = l_1 l_2 = 0, \; 0/0, \; \pm\pi.$$

In the first case d_1 is the tangent from the origin to the circle of center P' and radius y_1'', in the second case $d_2 = 0$; in the third

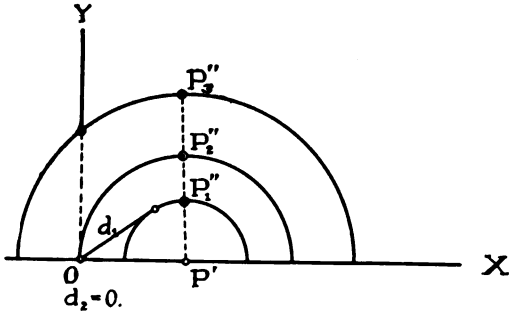

FIG. 18.

case $|d_3|$ is the half intercept on the y-axis of the circle of center P' and radius y_3''. The second case represents a transition from a wholly real to a wholly imaginary distance.

The distance from one of the three given elements to another of them is wholly imaginary; from (x', iy_1'') to (x', iy_2'') it is, for example, $i(y'' - y_1'')$. In general, to find the distance from any element of a real line to any other element of that line we subtract the coördinates of the first element from those of the second

[1] The case where an element is I or J requires special treatment.

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measured along the line as axis from any point thereof as origin.

Nor is the construction of the complex distance from a real point O to a red vector $\tilde{K}$ at all difficult. This is shown in fig. 19. The distance is $\tilde{d} = d' + id''$, where of course d' and d'' are

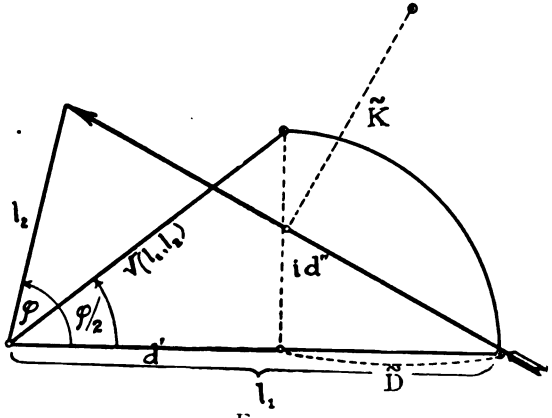

FIG. 19.

measured in the same direction. Thus the distance to the vector K is the same as that to the vector $\tilde{D}$. The construction of the distance from a vector $\tilde{K}$ to a vector $\tilde{M}$ is given in fig. 20. The

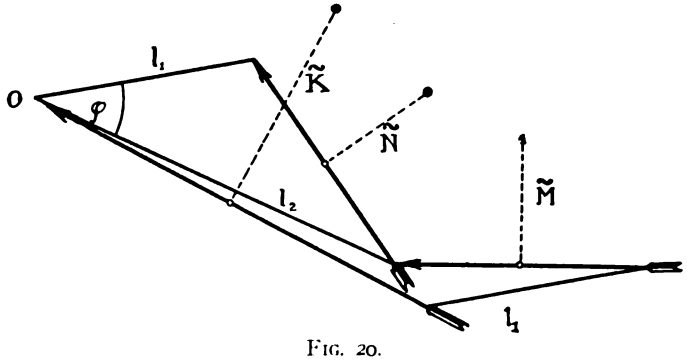

FIG. 20.

distance is the same as that from O to $\tilde{N}$. The paradox is to be noted that although the distance from O to $\tilde{K}$ is nothing, yet the distance $O\tilde{M}$ differs from the distance $\tilde{K}\tilde{M}$.

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From the formula and the construction for the distance between two points we can derive that for the distance from a line to a point. We have only to pass through the point a line perpendicular to the given line, find where this intersects the given line and then get the distance between the given point and this point of intersection. If the line, referred to rectangular axes be

$$\tilde{a}\tilde{x} + \tilde{b}\tilde{y} + \tilde{c} = 0,$$

while the point is $(\tilde{x}_1\ y_1)$ this will be found to give for the distance desired

$$\frac{\tilde{a}\tilde{x}_1 + \tilde{b}\tilde{y}_1 + \tilde{c}}{\sqrt{\tilde{a}^2 + \tilde{b}^2}}$$

Suppose that referred to rectangular axes through O, the center of the line, the equation becomes

$$\tilde{y} = e^{i\phi}\tilde{x}.$$

Then O with $(1,\ e^{i\phi})$ determines the line. Similarly O with

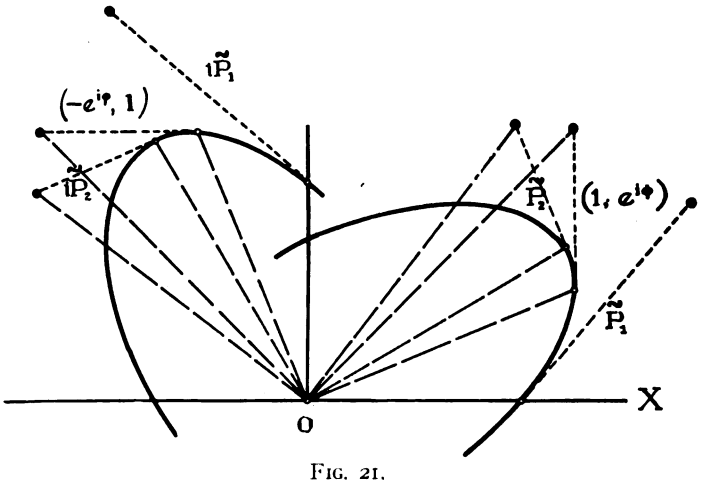

FIG. 21.

$(-e^{i\phi},\ 1)$ determines a line related to axes $\overline{OY}$ and the opposite of OX precisely as the above line is to OX, and OY; the line,

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in fact,

$$\tilde{x} = -e^{i\phi}\tilde{y} \text{ (see fig. 21).}$$

If the first line, with all its elements, be rotated positively through a quadrant, any element $(\tilde{x}, \tilde{y})$ will be brought into coincidence with the element $(\tilde{y}, -\tilde{x})$ belonging to the second. We are led then to the following definition.

Two lines having the same center are perpendicular if by a rotation of one of them through a quadrant it can be brought into coincidence with the other. In particular, an *I*-line or a *J*-line is perpendicular to itself. Similarly, two lines are parallel if by a shift without turning one can be brought wholly into coincidence with the other. In particular, two *I*-lines are parallel as are also two *J*-lines.

Two lines not having the same center are perpendicular if one is parallel to or perpendicular to the other. In particular, two *I*-lines are perpendicular as are also two *J*-lines.

In fact, two *I*-lines make any real angle you please with each other, since an *I*-line comes into coincidence with itself for any turn whatsoever. The same is true of two *J*-lines. Analytically, if

$$y = \pm ix,$$

then also

$$x \sin\phi - y\cos\phi = \pm i(x\cos\phi - y\sin\phi).$$

By no real shift and turn can an *I*-line be brought into coincidence with a *J*-line. No more can a line of slope $e^{i\phi}$ be so brought into coincidence with one of slope $e^{-i\phi}$ when both ϕ and ϕ_1 lie between 0 and π. If the red vectors corresponding to elements of the one so lie that to one looking along them the center of the line is on the left, then for the vectors belonging to the other the center is on the right. It is, indeed, an exception when one imaginary line can by a real turn be brought into coincidence

$$y = \tilde{m}x \quad \text{and} \quad y = \tilde{n}x,$$

the tangent of the angle through which the left one must be turned

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to come into coincidence with the right is

$$t = \frac{\tilde{n} - \tilde{m}}{1 + \tilde{m}\tilde{n}},$$

which is usually complex.

Return then to our problem, the distance from a point

$$(\tilde{x}_1, \tilde{y}_1) \equiv \tilde{P}_1 \quad \text{to} \quad y = e^{i\phi} x.$$

The perpendicular line though $\tilde{P}_1$ is $\tilde{x} - \tilde{x}_1 = e^{i\phi}(\tilde{y} - \tilde{y}_1)$ and the distance sought is

$$\tilde{d} = \frac{y_1 - e^{i\phi} x_1}{\sqrt{1 + e^{2i\phi}}}.$$

If the line is a circular ray the denominator vanishes and the distance becomes infinite unless the numerator vanishes also, that is, unless $\tilde{P}_1$ is upon the ray. To see this otherwise, note that the perpendicular to an I-ray through any point is an I-ray. If the point is on the first ray it is of course no distance from it. If

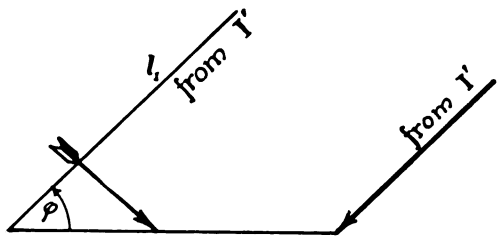

FIG. 22.

the point is not on the ray it is necessary to go along the perpendicular until $\tilde{I}$ itself, common to the two rays, is reached. This is an infinite distance as the construction in fig. 22 shows. In particular, suppose the point is $(2, i)$ the I-ray through it is

$$\tilde{y} = i(\tilde{x} - 1)$$

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and is perpendicular to $\tilde{y} = i\tilde{x}$ through the origin. I or $(\infty, i\infty)$

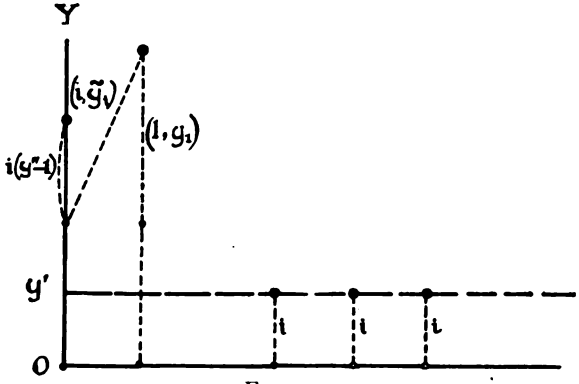

FIG. 23.

is their common point the distance of which from $(2, i)$ is

$$\underset{x=\infty}{L}\sqrt{(x-2)^2-(x-1)^2} = L\sqrt{-3x+3} = \infty i$$

When the line is of real slope, the perpendicular to it through any element, *i. e.*, any red vector, also has real slope. The distance has for its real part the distance from the black point of the red vector to the black line of the line of real slope while the imaginary part will be the difference of the projections upon the perpendicular of the given red vector and the red vector of the intersection. Thus from $y = i$ to $(\tilde{x}, \tilde{y})$ the distance is

$$+y' + i(y'' - 1).$$

The distance from one red vector to another can be represented in terms of the distances along two lines of real slope, one through each vector. Thus in fig. 24,

$$\begin{aligned}\tilde{A}\tilde{C}^2 &= \tilde{A}\tilde{B}^2 + \tilde{B}\tilde{C}^2 + 2\tilde{A}\tilde{B}\cdot\tilde{A}\tilde{C}\cos\omega \\ &= \tilde{A}\tilde{E}^2 + \tilde{E}\tilde{C}^2 + 2\tilde{A}\tilde{E}\cdot\tilde{E}\tilde{C}\cos\phi.\end{aligned}$$

In the last member $\tilde{E}\tilde{C}$ is a pure imaginary $= ik$ say. Taking coördinates as indicated,

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$$\tilde{A}\tilde{C}^2 = (x_c' + ix_c'')^2 - k^2 + 2i(x_c' + ix_c'')\, k\cos\phi$$
$$= x_c'^2 - m^2 + 2ix_c' k\cos\phi.$$

If the lines of real slope through $\tilde{A}$ and $\tilde{C}$ are drawn at right angles $\tilde{B}$ will be an element of a circle on $\tilde{A}\tilde{C}$ as diameter. All the elements gotten in this way will have their black points on a circle of diameter x_c' and their blue points on a circle of diameter

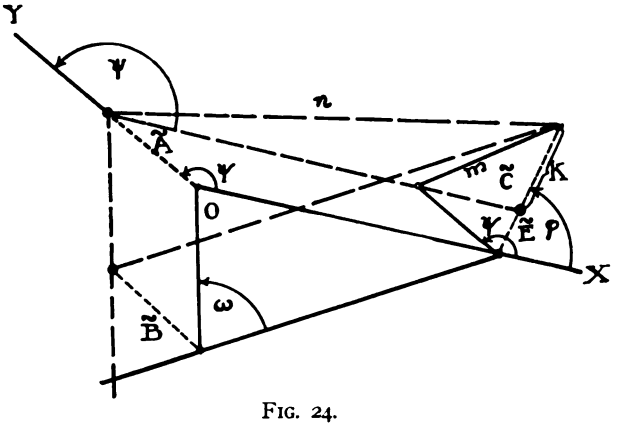

FIG. 24.

n. Other elements are obtained by the intersection of lines of imaginary slope passing through $\tilde{A}$ and $\tilde{C}$. In particular, the circular rays through $\tilde{A}$ and $\tilde{C}$ intersect in $\tilde{I}$ and $\tilde{J}$ and two other points. The locus of all such points is, in general, a circle of complex radius and complex center.

AREA

The area of a triangle whose vertices are $\tilde{P}_1$, $\tilde{P}_2$, $\tilde{P}_3$ is, coördinates being rectangular,

$$\frac{1}{2}\begin{vmatrix} \tilde{x}_1, & \tilde{y}_1, & 1 \\ \tilde{x}_2, & \tilde{y}_2, & 1 \\ \tilde{x}_3, & \tilde{y}_3, & 1 \end{vmatrix}.$$

In case $\tilde{P}_1$, and $\tilde{P}_2$ are on the line $\tilde{y} = \tilde{m}\tilde{x} + \tilde{b}$ this becomes

$$\tfrac{1}{2}(\tilde{m}\tilde{x}_3 + \tilde{b} - \tilde{y}_3)(\tilde{x}_1 - \tilde{x}_2).$$

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Here the expression in the first parenthesis is the distance from $\tilde{P}_3$ to the line $\tilde{P}_1\tilde{P}_2$ multiplied by $\sqrt{(1+\tilde{m}^2)}$, while $\tilde{x}_1 - \tilde{x}_2$ is the distance $\tilde{P}_1\tilde{P}_2$ divided by $\sqrt{(1+\tilde{m}^2)}$. Evidently the triangle is finite and not zero if the vertices all lie in the finite region and are non-collinear. In particular, suppose the points are $(0, 0)$, $(1, i)$, $(2, i)$, of which the first two are on a circular ray at no distance from each other, but at an infinite distance from the third; the area is $-i/2$. This may be verified by noticing that the last two are on $y = i$, which is distant i from $(0, 0)$.

Fig. 25 shows how the area is made up in the general case. The real part is the triangle $P_1'P_2'P_3' + 3$ quadrilaterals of the

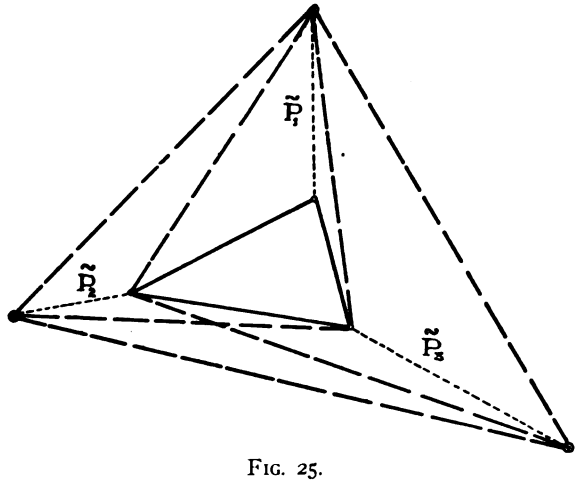

FIG. 25.

type $P_3'\tilde{P}_2\tilde{P}_3P_2'$. The imaginary part is the sum of three quadrilaterals of the type $P_2'P_1'P_3'\tilde{P}_1$. The area of $P_3'\tilde{P}_2\tilde{P}_3P_2'$ is the opposite of that of $P_3'P_2''P_3''P_2'$, which is

$$\tfrac{1}{2}(x_2''y_3'' - x_3''y_2'').$$

Thus the sum of the three areas of the type is

$$-\tfrac{1}{2}\begin{vmatrix} x_1'' & y_1'' & 1 \\ x_2'' & y_2'' & 1 \\ x_3'' & y_3'' & 1 \end{vmatrix},$$

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the area of $P_2'P_1'P_3'P_1$ is i times that of $P_2'P_1'P_3'P_1''$ which is $\frac{1}{2}\{(x_3'-x_2')y_1''-x_1''(y_3'-y_2')\}$. Thus the sum of the three areas of the type is

$$\frac{i}{2}\begin{vmatrix} x_1' & y_1'' & 1 \\ x_2' & y_2'' & 1 \\ x_3' & y_3'' & 1 \end{vmatrix} + \frac{i}{2}\begin{vmatrix} x_1'' & y_1' & 1 \\ x_2'' & y_2' & 1 \\ x_3'' & y_3' & 1 \end{vmatrix}.$$

It can be verified geometrically that in case P_1, P_2, and P_3 all belong to the same circular ray both the real and the imaginary parts of the triangle area vanish. By parallel projection it then follows that the area vanishes when the three vertices all belong to the same elliptic line.

THE CIRCLE

We consider first

$$\tilde{x}^2+\tilde{y}^2=1,$$

with its circle of black points $x'^2+y'^2=1$.

Suppose that $x'>1$ and $x''=0$, then

$$y'=0 \text{ and } y''=i\sqrt{(x'^2-1)}.$$

Thus, as the black point of a red vector belonging to the circle describes the x-axes, the blue point describes a blue rectangular hyperbola, a supplementary curve to the circle.[1] Moreover, since a revolution of the axes, keeping them rectangular, does not alter the equation of the circle, there is such an hyperbola tangent to every point of the black circle and coincident with a revolved position of this hyperbola. The black circle separates the part of the plane where elements of the circle exist from the part where they do not.

$$(\tilde{x}-a)^2+(\tilde{y}-b)^2=r^2,$$

differs from the case just considered only by a magnification by r and a shift of center to (a, b).

As Poncelet[2] long ago showed, they all pass through I and J,

[1] Poncelet, Traité des Propriétés Projectives, p. 29.

[2] Poncelet, Traité, p. 48.

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In fig. 26 the Q's are elements of the circular rays through O. Moreover, the circular rays through the center of each are tangent to that one, the points of contact being $\tilde{I}$ and $\tilde{J}$. The point of contact of a tangent from within the black circle will always be a red vector. Thus the tangent from P_0 (fig. 26) has the point of contact P_2 and is the line determined by P_0 and $\tilde{P}_2$. The blue

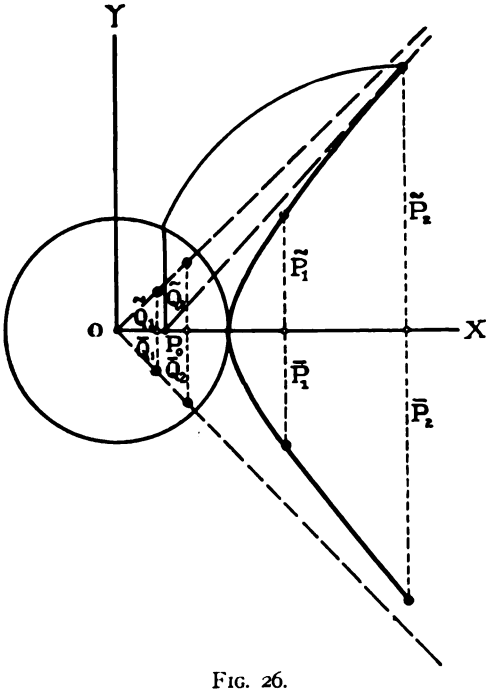

FIG. 26.

line from P_0 to P_2'' is tangent to the hyperbola through P_2''. The points P_0 and P_2' are a pair of points inverse with respect to the circle, and the distance from one to the other is double the red vector which bisects that distance. Thus, in Cauchy's representation, arrows join every point of the plane to the inverse point with respect to the circle.

Closely related to $x^2 + y^2 = 1$ is the purely imaginary circle $x^2 + y^2 = -1$.

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This gives for $x''=0$, $y''=i\sqrt{(1+x'^2)}$ so that (x', y'') lies on a rectangular hyperbola but the red elements are now parallel to the real axis of that hyperbola. As before, revolution about the center gives us the other red vectors, in particular, all the red radii of the blue circle enveloped by the hyperbolas. To any real

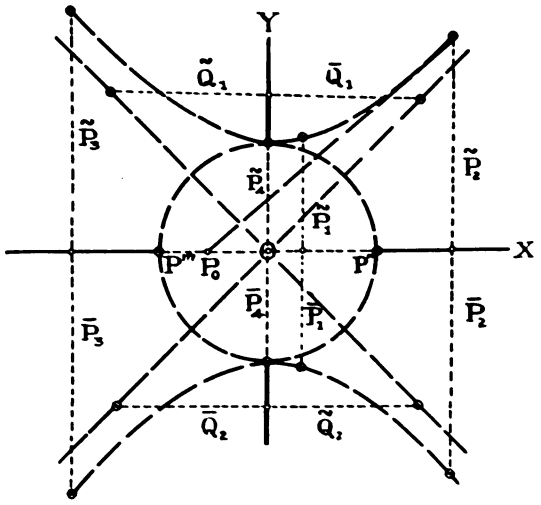

FIG. 27.

point P_0 there is an imaginary point of tangency represented by a red vector, say P_2. The black point on this is inverse to the point P_0 with respect to the imaginary circle. As in the other case the arrow joining two inverse points represents an imaginary point on the circle, the same point namely as that represented by the red vector whose black point is the mid-point of the arrow and which lies to the right of one looking along the arrow toward the barb. As before the circular rays through the center are tangent at $\tilde{I}$ and $\tilde{J}$ and the $\tilde{Q}$'s are elements of them (see fig. 27).

Consider the more general case

$$\tilde{x}^2+\tilde{y}^2=\tilde{a}^2,$$

equivalent to

$$x''^2+y''^2=a''^2=k. \qquad (1)$$

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$$x''^2 + y''^2 = a''^2 + k, \tag{2}$$

$$x'x'' + y'y'' = a'a'' \tag{3}$$

where k is real. Moreover, since the equations give

$$(a'^2 + k)x'' = a'a''x' \pm y'\sqrt{k(k + a'^2 + a''^2)},$$
$$(a'^2 + k)y'' = a'a''y' \mp x'\sqrt{k(k + a'^2 + a''^2)},$$

k is positive.

When the black point of a red vector lies upon (1) the blue point $(x' + x'', y' + y'')$ lies upon

$$x^2 + y^2 = (a' + a'')^2 + 2k,$$

while the vector has the length given by (2).

Fig. 29 represents $\tilde{x}^2 + \tilde{y}^2 = (1 - i)^2$. For $k = 0, 1, 3, 8$ the

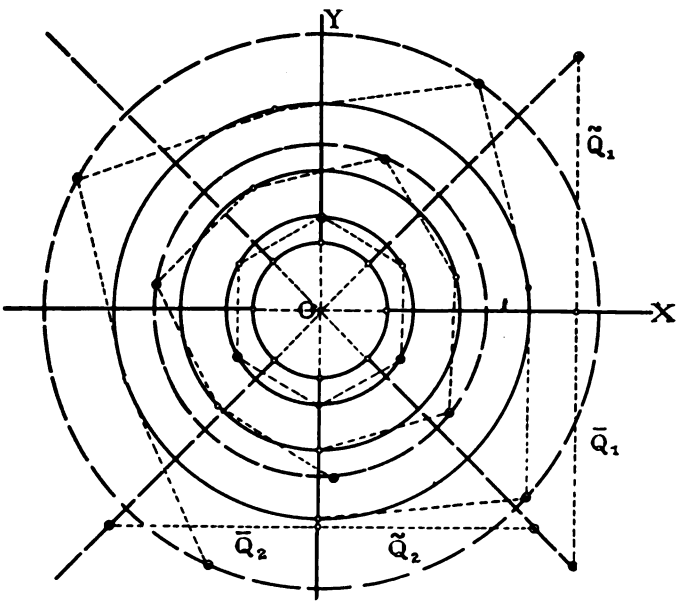

FIG. 29.

radius of the black circle is respectively 1, $\sqrt{2}$, 2, 3 while that of the corresponding blue circle is e, $\sqrt{2}$, $\sqrt{6}$, 4. Eventually, when

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k becomes infinite, the red vector becomes tangent to the black circle, becomes, in fact, either I or J. The Q's belong to the circular rays; all the other red elements belong to the circle.

Perhaps a better way of treating this case is the following:

The red vectors collinear with the origin and connecting the black circle

$$x^2 + y^2 = x'^2 + y'^2 = a'^2$$

to the blue circle

$$x^2 + y^2 = (x' + x'')^2 + (y' + y'')^2 = (a' + a'')^2,$$

evidently satisfy the equation. Let us look upon this double circle as the fundamental curve.

Then

$$x^2 - y^2 = x_1'^2 - y_1'^2 = a'^2$$

and

$$x^2 - y^2 = (x_1' + x_1'')^2 + (y_1' + y_1'')^2 = (a' + a'')^2,$$

form together the supplementary curve $\tilde{x}_1^2 - \tilde{y}_1^2 = \tilde{a}^2$. That is to say, a curve such that, if the ordinates be multiplied by i, leaving the abscissas unchanged, the resulting double-vectors satisfy

$$\tilde{x}^2 + \tilde{y}^2 = \tilde{a}^2.$$

This gives

$$y' = -y_1'', \; y'' = y_1'.$$

Now just as vectors radial from the origin satisfy the fundamental curve so do such vectors satisfy the supplementary curve. And just as on the fundamental curve

$$\frac{x''}{x'} = \frac{y''}{y'} = \frac{a''}{a'},$$

so also on the supplementary does

$$\frac{x_1''}{x'} = \frac{y_1''}{y_1'} = \frac{a''}{a'}.$$

Therefore

$$(x', y') \equiv (x_1', -y_1'') \equiv \left(x_1', -\frac{a''}{a'} y_1'\right)$$

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and lies upon

$$x^2 - \frac{a'^2}{a''^2} y^2 = 1,$$

while

$$(x' + x'',\ y' + y'') \equiv (x_1' + x_1'',\ -y_1'' + y_1') \equiv \left(x_1' + x_1'',\ \frac{a' - a''}{a' + a''}(y_1' + y_1'')\right)$$

and lies upon

$$x^2 - \left(\frac{a' + a''}{a' - a''}\right)^2 y^2 = 1.^1$$

In the particular example

$$\tilde{x}^2 + \tilde{y}^2 = (1 - i)^2$$

these, so to speak, *companions* to the supplementary curve are

$$x^2 - y^2 = x'^2 - y'^2 = 1,$$

and

$$x^2 - 0y^2 = (x' + x'')^2 - 0(y' + y'')^2 = 0,$$

i. e.,

$$x^2 = (x' + x'')^2 = 0.$$

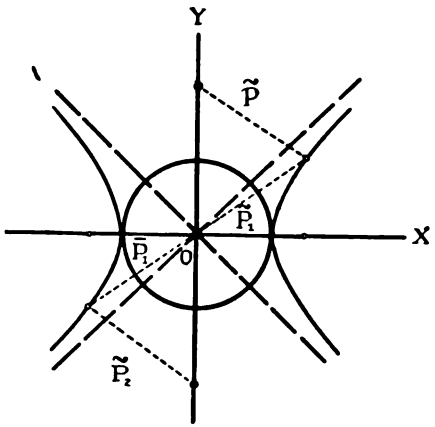

FIG. 28.

[1] The vector $\tilde{P} \equiv (\tilde{x},\ \tilde{y})$ is normal to the first companion curve. Cauchy's corresponding vector is tangent to the same and is terminated by the asymptotes.

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By merely revolving the figure we then get all the other supplementary curves and their companions. In fig. 28 $\tilde{P}_1$ and $\bar{P}_1$ are elements of the supplementary curve while $\tilde{P}$ and $\bar{P}$ belong to the companion pair, that is, therefore, to

$$\tilde{x}^2 + \tilde{y}^2 = (1 - i)^2.$$

All the types of circles considered have had a real center. It is only necessary to make an imaginary shift to transform them into circles with imaginary centers. For convenience, let the shift of amount il be made parallel to the x-axis. The circle of complex radius $\tilde{a}$ then becomes

$$(\tilde{x} - il)^2 + \tilde{y}^2 = \tilde{a}^2.$$

Every point satisfying $\tilde{x} + \tilde{y}^2 = \tilde{a}^2$ is changed by a red vector il parallel to the x-axis. As a result of the changes only two points can be real; those namely, if such exist, which satisfy

$$x'^2 + y'^2 = a'^2 + l^2 - a''^2$$

$$-lx' = a'a''.$$

These give

$$y'^2 = (a'^2 + l^2)\left(1 - \frac{a''^2}{l^2}\right),$$

and therefore, for a real point,

$$l^2 \geq a''^2.$$

Fig. 30 illustrates $(\tilde{x} - il)^2 + \tilde{y}^2 = 1$. S and T are the real points, Q and R are the centers of the circular rays through the center $\tilde{O}$ of the circle.

The completion of the circle $\tilde{x}^2 + \tilde{y}^2 = 1$ by the introduction of its complex points enables us to extend our notions of an angle and its functions. The angle $\tilde{\theta} \equiv \theta' + i\theta''$ is represented by the black circular sector (fig. 31) of area $\theta'/2$ together with the red hyperbolic sector of area $i\theta/2$ whose initial line is the terminal line of the black sector. The functions $\cos \tilde{\theta}$ and $\sin \tilde{\theta}$ are merely the coördinates of the red vector $\tilde{P}$. We have, in fact, directly

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from the figure

$$\cos\tilde{\theta} = \cos\theta' \operatorname{ch}\theta'' - i\sin\theta \operatorname{sh}\theta',$$
$$\sin\tilde{\theta} = \sin\theta' \operatorname{ch}\theta'' + i\cos\theta \operatorname{sh}\theta',$$
$$\tan\tilde{\theta} = \frac{\tan\theta' + i\operatorname{th}\theta''}{1 - i\tan\theta' \operatorname{th}\theta''}$$

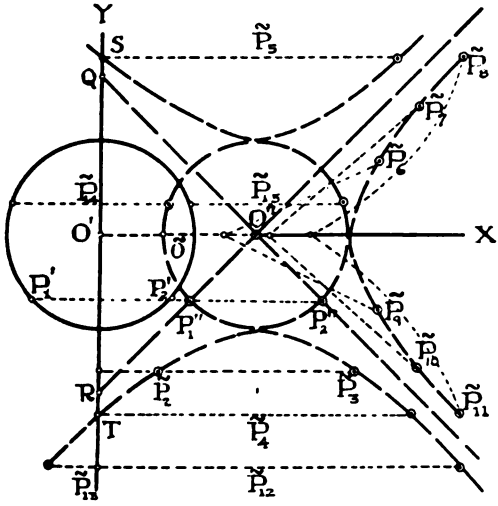

FIG. 30.

Note that $\tan^{-1} i = i \operatorname{th}^{-1} 1 = i\infty$ the imaginary part of the angle that the I-ray makes with x-axis. Note also that

$$\tan^{-1} ki = \pi/2 + \tan^{-1} i/k.$$

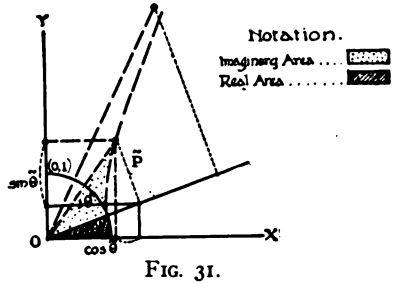

FIG. 31.

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In particular,

$$\tan^{-1} \infty i = \pi/2 = \tan^{-1} \infty = \tan^{-1} (\infty e^{i\theta}).$$

Thus, in fig. 32, letting

$$\phi'' = \tan^{-1} BB'OB, \phi' = \pi/2,$$

we construct $\tilde{\phi}$ as indicated. The red elements $\tilde{A}$ and $\tilde{B}$, the numerators of the tangent ratios, evidently belong to the same

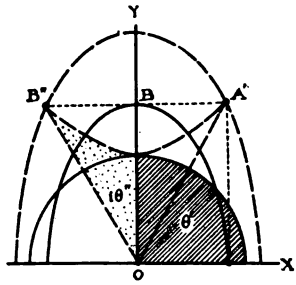

FIG. 32.

elliptic line through the origin and making the angle $\tilde{\phi}$ with the x-axis.

One can write, of course,

$$\tan^{-1} ki = \theta + \tan^{-1} si,$$

but this will give

$$\tan\theta = \frac{(k-s)i}{1-ks}$$

so that θ can be real only when $s = k$ or $1/k$. This requires θ to be an integral multiple of $\pi/2$.

The functions $\cos\tilde{\theta}$ and $\sin\tilde{\theta}$, as well as the argument $\tilde{\theta}$, can be expressed as ratios of areas.[1] We take, in fact, for the denominator of each ratio the triangle (0, 0), (0, 1), (1, 0). The numerator of the cosine ratio is then (0, 0), $\tilde{P}$, (0, 1); of the sine ratio it is the triangle (0, 0) (1, 0), $\tilde{P}$, of $\tilde{\theta}$ it is the complex sector, whose initial line is the x-axis and whose terminal line is (0, 0)$\tilde{P}$.

The ratio of all areas being unaltered by parallel projection, we

[1] Haskell, M. W., Bulletin Math. Soc., I, 155.

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can replace the circle by an ellipse and the perpendicular diameters by conjugate diameters. The rectangular hyperbola is replaced by one whose asymptotes pass through the blue points of the elliptic elements at infinity. The argument $\tilde{\theta}$ is the ratio of a real elliptic sector plus an imaginary hyperbolic sector to the triangle having for side the conjugate semidiameters of the ellipse. The cosine and sine ratios have the same denominator but the numerator of the first is a triangle whose base is the diameter coincident with the initial line of $\tilde{\theta}$ and whose vertex is the elliptic element having its blue point on the terminal line of $\tilde{\theta}$. The numerator of the cosine ratio has the same vertex but the base is the diameter conjugate to that used in the sine ratio, the diameter in fact parallel to the now elliptic element $\tilde{P}$.

A still further generalization can be made if instead of confining ourselves to parallel projection we use projection from a point.[1]

The line at infinity then projects into a line z, while parallels to it project into lines meeting it in a certain fixed point Y. The segments representing the circular points at infinity project into unequal segments; they are such, namely, that their blue points are harmonically conjugate with respect to their common black point and the fixed point Y. The circular rays through any point of the plane project into two imaginary rays through $\tilde{I}\tilde{J}$, the *projected* imaginary points. Lines at right angles are projected into lines harmonically conjugate with respect to $\tilde{I}$ and $\tilde{J}$.

Equal consecutive segments along a line project into segments such that of three consecutive division points the middle one is harmonically separated from z by the other two.

In place of rectangular axes we have axes harmonically conjugate with regard to I'' and J''. In particular, we might take a pair of lines one through Y, call it the y-axis, the other through the common point of $\tilde{I}$ and $\tilde{J}$ call this the x-axis and the point X. The axes so chosen intersect in O; on the x-axis we take, where we please, a point for (1, 0). The coördinates of every point in the plane are then determined. A diagram (fig. 33) makes this

[1] For the analytic theory see Sophus Lie. Vorlesungen über continuerlichen Gruppen, pp. 13 seq.

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plainer than words.[1] The conic (it happens to be an ellipse) through (0, 1), (1, 0), (0—1), (—1, 0), and tangent at these points to lines to (∞, 0) and (0, ∞) has the equation, in the chosen coördinates, $x^2 + y^2 = 1$; is, indeed, the projection of a

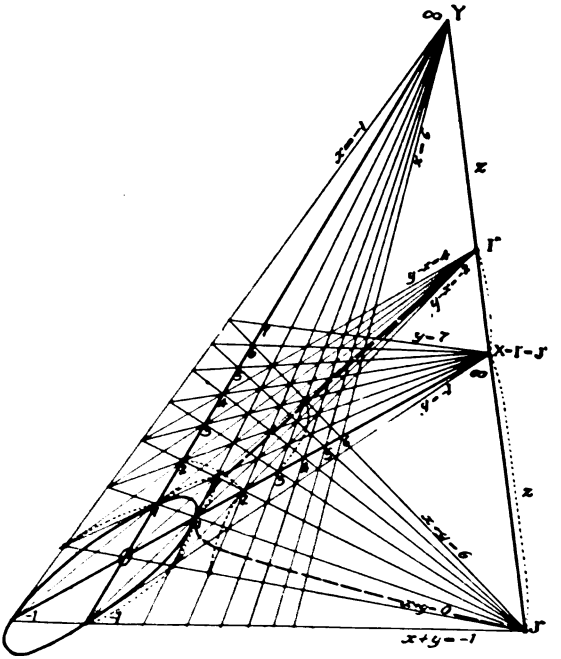

FIG. 33.

circle, while O, the pole of z with respect to the conic, is the projection of that circle's center. Let us call the conic C_2. Various red vectors belonging to the $\tilde{I}$- and $\tilde{J}$-rays through O are indicated. They are projections of elements of the circular rays through the center of the circle. The two blue curves, portions of which are drawn, are supplementary curves of the conic, and projections of supplementary curves of the circle. The perimeter of the conic, defined as $\int \sqrt{dx^2 + dy^2}$, is 2π. The arc

[1] For greater detail see Young, Theory of Point Sets, Chapter 2.

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(0, 1) (1, 0) = arc (1, 0) (— 1, 0) = $\pi/2$. Similarly the area of the conic, defined as $\int\int dx dy$, is π.

As heretofore an angle θ will have the ratio of a complex sector to the triangle O, (1, 0), (01).

All these statements remain true no matter what sort of diagram may be gotten by point projection of this diagram. The ellipse, in particular, might get projected into a hyperbola, the supplementary curves then becoming ellipses.

The correspondence between the various projections is complete, so that when we are proving a theorem concerning any diagram, we are at one and the same time proving a like theorem concerning every projection of that diagram. For example, in the representation of a complex element by an arrow whose butt is at the center of the $\tilde{J}$-ray and whose barb is at the center of the $\tilde{I}$-ray through the element, it was found, when the element belonged to a circle, that butt and barb were inverse points with respect to that circle. In the projection butt and barb are inverse, in terms of the projected coördinates, with respect to the projection of the circle, be it what conic it may.

In all the above, both the centre of projection and the plane receiving the projection are assumed to be real. Before considering projection from an imaginary center or thrown upon an imaginary plane, it will be necessary to consider imaginary elements in space.

Von Staudt's Representation[1]

In Fig. 33 $\tilde{I}$ and $\tilde{J}$ are the intersections of the line z with the conic C_2. Now, without changing the conic at all, merely revolving the axes, keeping them conjugate, and always regarding z as the projection of a line at ∞ parallel to the Y-axis, we get a different pair of intersections and a different pair of supplementary curves. Thus, what we are to consider as the imaginary intersection of a curve and a line depends upon the choice of axes, depends upon what line through the origin we shall regard as the projection of a parallel to the line at infinity. We can avoid this by saying that the $\tilde{I}$ intersection is the collectivity

[1] Von Staudt, Geometrie der Lage. Lüroth, Math. Ann., Vol. VIII.

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of all the $\tilde{I}$'s, while the $\tilde{J}$ intersection is the collectivity of all the $\tilde{J}$'s. The particular pair $\tilde{I}$ and $\tilde{J}$ used for a symbol of all of them is then what depends upon the choice of axes. The blue points I'', J'' form, in fact, an elliptic involution[1] of points upon the line z. Von Staudt calls this involution of points regarded as having the $\tilde{I}$ direction, one intersection; while regarded as having the $\tilde{J}$ direction he calls it the conjugate intersection. It will be noted that any I' and Y are a pair belonging to the involutions of points on z. Thus the involutions can be called $J''\ I'\ I''\ Y$ and $Y\ I''\ I'\ J''$. Similarly there are the projective involutions of center O determined by and therefore properly denoted by any two pairs of axes. Every real line that bears a red vector. bears an involution of points determined by that red vector. Every two red vectors not borne by the same real line determine an involution of lines whose center is the center of the imaginary line joining the two red vectors and which cuts out on the bearer of each red vector the very involution of which the bearer may be taken as a symbol.[2] I say taken as the symbol, for a vector $\tilde{P}$ has a definite conjugate vector $\bar{P}$ and its bearer meets z in a definite point K, so that if P''' is the blue point of $\bar{P}$ the involution is $P'''P'P''K$. Similarly $P''P'P'''K$ is symbolized by $\bar{P}$.

Again $O\tilde{P}$ is the line of center O of which $\tilde{P}$ is an element, while $O\bar{P}$ is the conjugate line. Suppose that Q is the real point of the $\tilde{I}$-ray through $\tilde{P}$, while R is the real point of the $\tilde{J}$-ray. Then $Q—\tilde{J}P'''IP''$ is a harmonic set as is also $R—\tilde{J}P'''IP''$. If on the bearer of $\tilde{P}$ we associate all the pairs of points S''', S'' such that $Q—\tilde{J}S'''\tilde{I}S''$ is a harmonic set we merely reproduce the involution $\tilde{P}$. In particular, if axes become rectangular and z actually goes to infinity, $S'''Q''$ is a right angle whose revolving arms sweep out the involutions $J'''XI''Y$ on z, $P'''P'P''\ \infty$ on

[1] Reye, Geometrie der Lage.

[2] If the involution be taken on the x-axis, say, with the origin as center and foci at $x = \pm i$, then any real point pair belonging to the involution is $x = \pm \operatorname{ch} \theta'' + i \operatorname{sh} \theta''$. An imaginary point pair is gotten by multiplying the coördinates of a real pair, the one by $\cos \theta' + i \sin \theta'$, the other by $\cos \theta' - i \sin \theta'$. This is the same as to say that any point pair is given by $x = \pm \cos \tilde{\theta} + i \sin \tilde{\theta}$.

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the bearer of $\tilde{P}$, and whose arms constitute the involution of lines through Q. At the same time $J''OI''$ becomes a right angle whose revolution gives the circular involution or ray of center O and cuts out the involution or element $J'''XI''\ Y$ on z.

Just as a red vector is the symbol of an involution on a line, so the red vector of $\tilde{\theta}$ is the symbol of an involution about the vertex of $\tilde{\theta}$ for center, the involution, viz., whose rays make the angles $-\theta''$, 0, θ'', $\pi/2$ with the terminal line of θ'. In rectangular coördinates these would be the two arms of an angle and the two bisectors of the angle. A glance at fig. 31 shows that this involution cuts out on the perpendicular to the terminal line of θ'

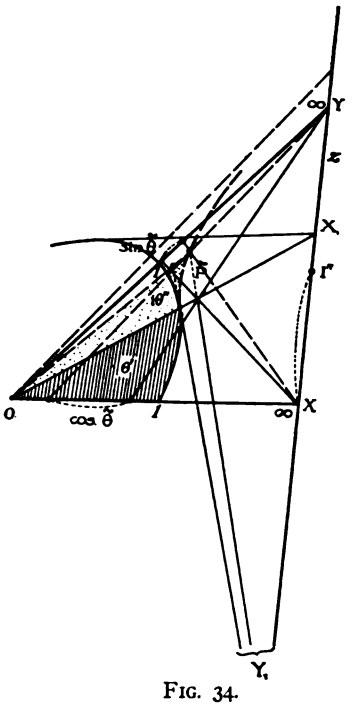

FIG. 34.

through the tip P'' of θ'' the involution $-P''$, 0, P'', ∞ or $-\text{sh}\ \theta''$, 0, $\text{sh}\ \theta''$, ∞ whose symbol is $\tilde{P}$ or $\sin \theta''$. Sin $\tilde{\theta}$ is the projection on the y-axis and cos $\tilde{\theta}$ the projection on the x-axis of that

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involution. Similarly tan θ'' is the symbol of the involution $-\tan\theta''$, 0, tan θ'', ∞ cut out on the perpendicular to the terminal line of θ' through its tip P'.

These statements can all be modified to fit the generalized projected coördinates. In place of perpendicular lines we have lines harmonic with regard to the circular rays through their intersection, say *quasi*-perpendicular.[1] In place of parallel lines we have lines meeting on z, say *quasi*-parallel. Instead of equal line-segments, vectors and angles we have line-segments, vectors and angles whose dimensions, as expressed in the projected coördinates, come out equal. Thus fig. 31 goes over into something like fig. 34, where OX_1 is the terminal line of θ' and OY_1 is quasi-perpendicular thereto. In fact, all lines meeting in Y_1 are *quasi*-perpendicular to each line through X_1, just as all meeting in Y are quasi-perpendicular to each through X.

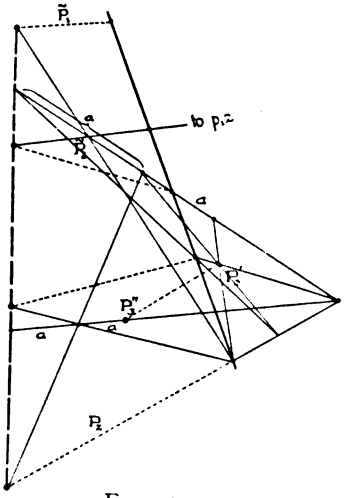

FIG. 35.

Others of our figures can be similarly projected. In particular, it will be interesting to consider the various constructions for a third element given two elements of a line, figs. 9, 10, 11, 12 and 13.

[1] Salmon, Higher Plane Curves.

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We saw in fig. 9 that the row of blue points was projective to the row of corresponding black points, in fact, that they were similar, the infinite points corresponding. When we chose our coördinates, however, so that they become infinite on a line z then it is the intersections of blue line and black line with z that correspond. Call these P_∞'', P_∞'. Then $\tilde{P}_1$, $\tilde{P}_2$, $\tilde{P}_\infty$ completely establish the correspondence of the two rows, giving, as they do, three pairs of coördinated points. It is therefore, possible, given two elements $\tilde{P}_1$, $\tilde{P}_2$ of a line and given on P_1P_2 the part P_3' of a

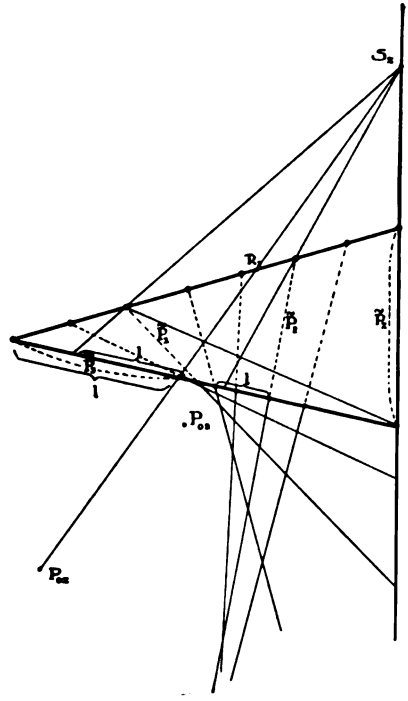

FIG. 36.

third element to choose the other part P_3'' anywhere whatever on $P_1''P_2''$. After that all is fixed. For example, given $\tilde{P}_1$, $\tilde{P}_2$ and with P_3' not on $P_1'P_2'$ fig. 35 shows how to find P_3''. It replaces fig. 11. If P_∞ is changed while $\tilde{P}_1$, $\tilde{P}_2$ and P_3' are fixed P_3'' in

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general moves. If it does not move P_∞' and P_∞'' are describing the two projective rows determined by $\tilde{P}_1\tilde{P}_2$ and the original $\tilde{P}_\infty$.

Given $\tilde{P}_1$, $\tilde{P}_2$ and $\tilde{P}_z$ to find the center of the line joining them we generalize the construction in fig. 12. The result is fig. 36. Here $P_0P_3'R_zS_z$ are harmonic. Note that, in general, the center varies as z changes, even though z remains a bearer of one of the elements joining the lines $P_1'P_2'$ and $P_1''P_2''$. Let us call the center we have obtained P_{0z}, while P_{02} is the center obtained when P_2 interchanges its rôle with P_z. The bearer of P_2 we call p_2. S_2 will lie on p_2 and must therefore be a different point from S_z. Thus P_{02} will be either at a different point than P_{0z} on $P_3'R_z$ or entirely off of that line. The construction gives the point as indicated in figure. P_0 is not entirely arbitrary, however, since it is the pole of some bearer p with respect to each of the infinite family of quasi-similar, quasi-concentric conics from some one of which every red element of the line starts in tangency. The center therefore always lies within the conic enveloped by the bearers $p_1, p_2, p_3, \ldots$ of $\tilde{P}_1, \tilde{P}_2, \tilde{P}_3, \ldots$ connecting the blue line with the black line of the figure. When p_1 is taken for z,

$$K_1 \equiv S_1 \equiv P_{01} \equiv P_1',$$

and the conics to which the red elements are tangent are all line-

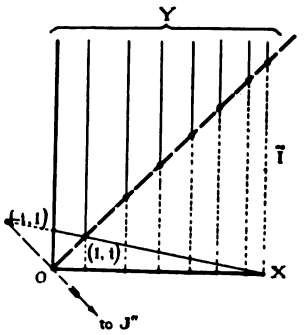

FIG. 37.

pairs, while the imaginary parts of the conjugates of the various red elements vanish. Similarly, when p_4 is taken for z,

$$R_4 \equiv S_4 \equiv P_{04} \equiv P_4'',$$

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and the conics are line-pairs, but the red elements are self-conjugate. If we attempt in either of these cases to construct red vectors other than those joining p_1 and p_4 we meet failure. The cases are rather too exceptional, however, to possess interest.

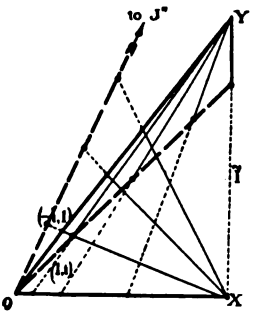

FIG. 38.

Figs. 37 · · · 40 show constructions for new vectors given the center of the line and a vector. Each line is an I-ray whose center is the origin and the given vector is $\bar{I}$. The vectors drawn

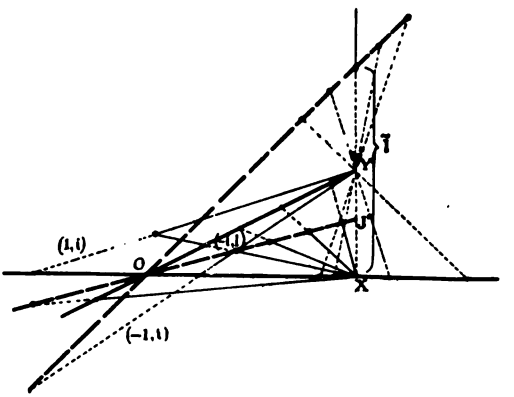

FIG. 39.

have one coördinate wholly real, the other wholly imaginary. Observe that in fig. 37 the vectors with $x''=0$ are apparently as they would be in ordinary rectangular coördinates; but all the other vectors, for example, those for which $y''=0$, are very

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different, the change is even more marked in 38, 39 and 40. Observe also that not only the red vectors but the involution representing the line is changed, since it is $O - XI''YJ''$.

Bearing in mind the possibility of such generalizations let us

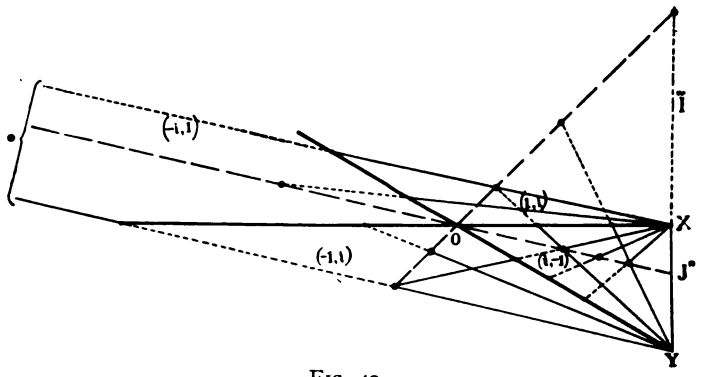

FIG. 40.

turn to the representation of conics and, for convenience, let us use ordinary rectangular coördinates.

THE CONIC

Any conic which by a real shift and turn of axis can be brought to the form

$$\frac{\tilde{x}^2}{a^2} + \frac{\tilde{y}^2}{b^2} = \tilde{k}^2$$

where a and b are real we call an ellipse. The axes of the ellipse are

$$a\tilde{k} = \tilde{c} \quad \text{and} \quad b\tilde{k} = \tilde{d}$$

where $\tilde{c}$ and $\tilde{d}$ are similar, *i. e.*,

$$\begin{vmatrix} c' & d' \\ c'' & d'' \end{vmatrix} = 0.$$

The supplementary curves when k^2 is real (for convenience let $k = 1$) are hyperbolas whose pairs of asymptotes are pairs of conjugate diameters of the ellipse. These asymptotes form invo-

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lutions and precisely the same involutions as are formed by the blue lines through the origin of the pair of conjugate imaginary lines $x^2/a^2 + y^2/b^2 = 0$. The asymptotes are tangent to the hyperbolas at infinity and cut out on the line infinity involutions which, in Von Staudt's sense, are the intersection of the aforesaid line-pair with the line infinity. We can use as the symbol of these two involutions the red vectors

$$\frac{b}{a}\tilde{I},\ \frac{b}{a}\tilde{J}$$

on the line infinity conceived as parallel to the y-axis.

The circular rays through the foci

$$(x - ae)^2 + y^2 = 0$$

and

$$(x + ae)^2 + y^2 = 0$$

are tangent to the ellipse, as can easily be verified in the usual

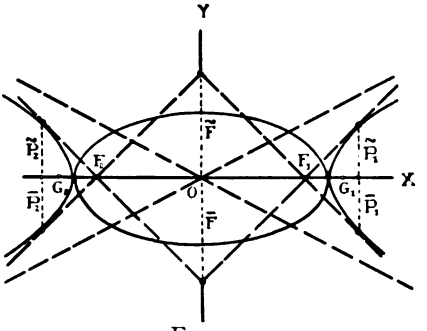

FIG. 41.

way. The thing can be pictured as fig. 41. The blue lines from the four foci $F_1F_2\tilde{F}\bar{F}$ to I'' and J'' are tangent at $\tilde{P}_1, \bar{P}_1, \tilde{P}_2, \bar{P}_2$ to

$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1,$$

a supplementary curve. G_1 and G_2 are foci of the hyperbola.

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The modification for the imaginary ellipse

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = -1$$

is but slight. Fig. 42 shows it. Note that the real foci are outside while the imaginary foci are inside of the blue ellipse.

Fig. 43 shows the four foci G_1, G_2, $\bar{G}$, $\bar{\bar{G}}$ of

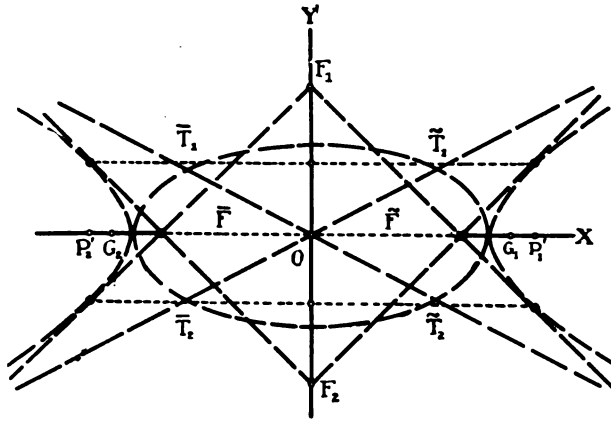

FIG. 42.

$$x^2 - y^2 = 1.$$

The figure also shows two supplementary curves; the circle

$$x^2 + y^2 = 1,$$

and the ellipse

$$(my + x)^2 + (y - mx)^2 = m^2 - 1.$$

Just as in the first, multiplying y by i changes the equation to that of the hyperbola, so in the second, multiplying $(my + x)$ by i produces the same effect. Obviously the blue hyperbola is the envelope of the totality of blue ellipses.

If the figure, exclusive of the coördinate axes, be turned through a right angle it becomes the figure for

$$x^2 - y^2 = 1,$$

the conjugate hyperbola.

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By parallel projection we get the hyperbolas

$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = \pm 1.$$

Notice, however, that the projections of the foci will not be the foci of the projected curve. These latter are on

$$x^2 + y^2 = a^2 + b^2,$$

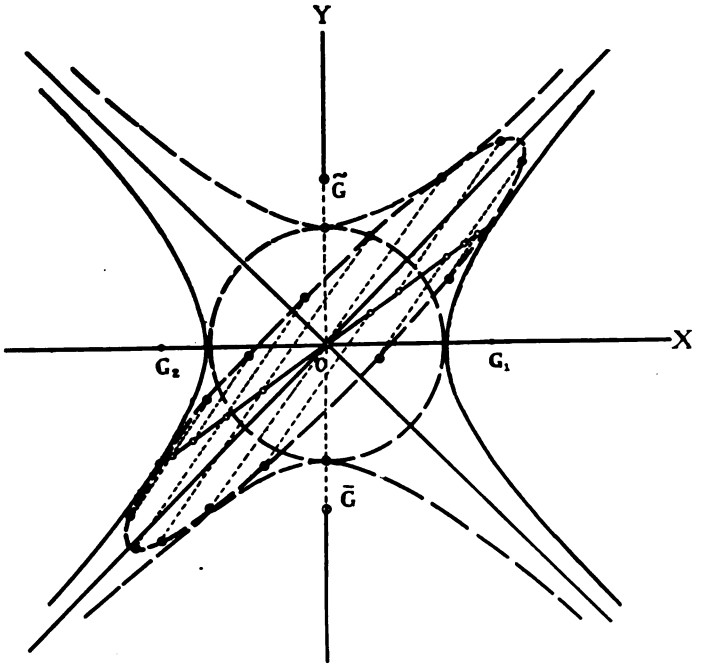

FIG. 43.

or are terminated by that.

Figure 44 shows the ellipse

$$\frac{\tilde{x}^2}{(2+2i)^2} + \frac{\tilde{y}^2}{(1+i)^2} = 1,$$

a special case of

$$\frac{\tilde{x}^2}{a^2} + \frac{\tilde{y}^2}{b^2} = \tilde{k}^2.$$

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The foci are all complex and the representative vectors join the foci of the black ellipse to the corresponding foci of the blue

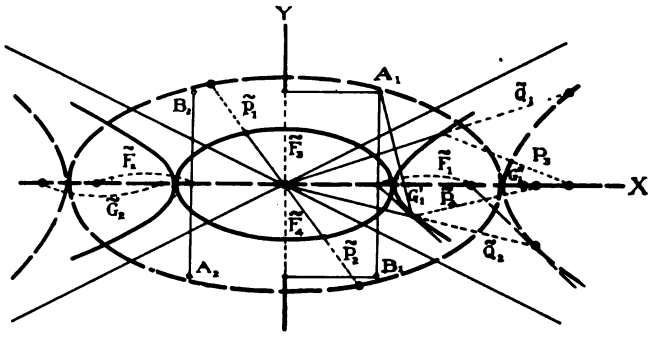

FIG. 44.

ellipse. $\tilde{G}_1$, $\tilde{G}_2$ are foci of a supplementary hyperbola

$$\frac{\tilde{x}^2}{(2+2i)^2} - \frac{\tilde{y}^2}{(1+i)^2} = 1.$$

The companion hyperbola, which is really a part of the ellipse under discussion, is

$$\frac{\tilde{x}^2}{(2+2i)^2} - \tilde{y}^2 = 1,$$

the blue constituent coinciding with the x-axis.

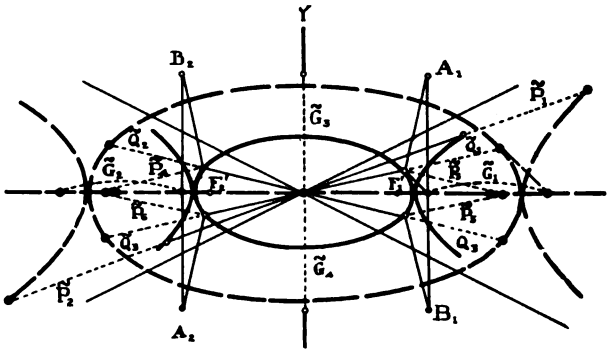

FIG. 45.

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The $\tilde{P}$'s are all elements of the ellipse; the Q's, of the supplementary hyperbola.

In fig. 45 the supplementary curve of fig. 44 is made fundamental. The I-ray through $\tilde{G}_1$ is tangent in $\tilde{P}_3$, the J-ray through B_1 in $\tilde{P}_8$. The Q's are now elements of the supplementary ellipse.

If the fundamental curve is

$$\frac{\tilde{x}^2}{a^2} \pm \frac{\tilde{y}^2}{b^2} = \tilde{k}^2,$$

then it has in the first place for elements red vectors radial[1] from the origin joining points on

$$\frac{x}{a^2} \pm \frac{y^2}{b^2} = k'^2.$$

to

$$\frac{x^2}{a^2} \pm \frac{y^2}{b^2} = (k' + k'')^2.$$

In the second place, it has the elements obtained by multiplying by i the y-coördinates of the radial elements of the supplementary curve

$$\frac{\tilde{x}^2}{a^2} \mp \frac{\tilde{y}^2}{b^2} = 1.$$

These elements belong to the companion curve

$$\frac{\tilde{x}^2}{a^2(k' + ik'')^2} \mp \frac{\tilde{y}^2}{b^2(k'' - ik')} = 1,$$

for which we can take

$$\frac{x^2}{a^2k'^2} \mp \frac{y^2}{b^2k''^2} = 1,$$

and

$$\frac{x^2}{a^2(k + k'')^2} \mp \frac{y^2}{b^2(k' - k'')} = 1,$$

as black curve and blue curve respectively. The equation of the companion curve, notice, is the same as that of the fundamental.

[1] That is, on real lines through the origin.

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In the third place, and finally, it contains all the elements gotten by referring the curve to all the possible pairs of conjugate diameters as axes and then taking the totality of non-radial elements of the companion curves.

The more general conic

$$\frac{\tilde{x}^2}{\tilde{a}^2}+\frac{\tilde{y}^2}{\tilde{b}^2}=1$$

where $\tilde{a}$ and $\tilde{b}$ are non-similar complex quantities can be made to depend on that just considered or more simply upon that of the circle of complex radius. For any element is at once a vertical projection of an element of

$$\tilde{x}^2+\tilde{y}^2=\tilde{a}^2$$

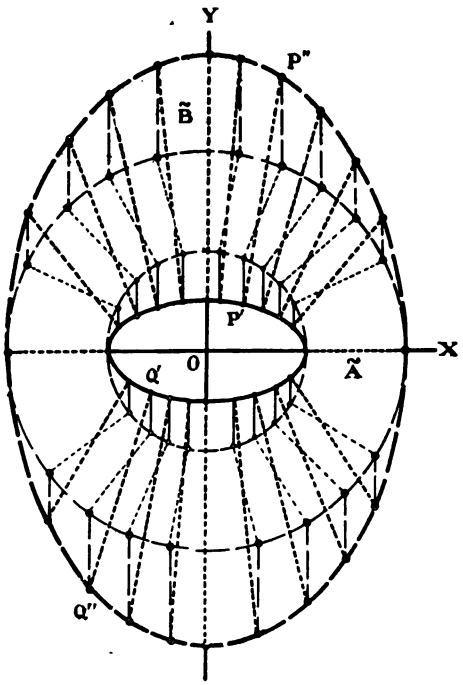

FIG. 46.

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and a horizontal projection of an element of

$$\tilde{x}^2 + \tilde{y}^2 = \tilde{b}^2,$$

the two elements from the auxiliary circles being collinear with the origin so that if $(\tilde{x}_1, \tilde{y}_1)$ is from the first circle while $(\tilde{x}_2, \tilde{y}_2)$ is from the second, then

$$\frac{\tilde{x}_1}{\tilde{x}_2} = \frac{\tilde{y}_1}{\tilde{y}_1} = \frac{\tilde{a}}{\tilde{b}}.$$

The elements divide into two sets, viz: Those which are determined by radial elements of the circles as shown in fig. 46, $\tilde{A}$, $\tilde{B}$, $\tilde{P}$, $\tilde{Q}$ et al. Those which are determined by non-radial elements of the circles as shown by the $\tilde{P}$'s, other than $\tilde{P}_3$ and $\tilde{P}_8$, in fig. 47.

The determination of $\tilde{P}_6$, $\tilde{P}_8$, $\tilde{P}_9$ by their end points is shown.

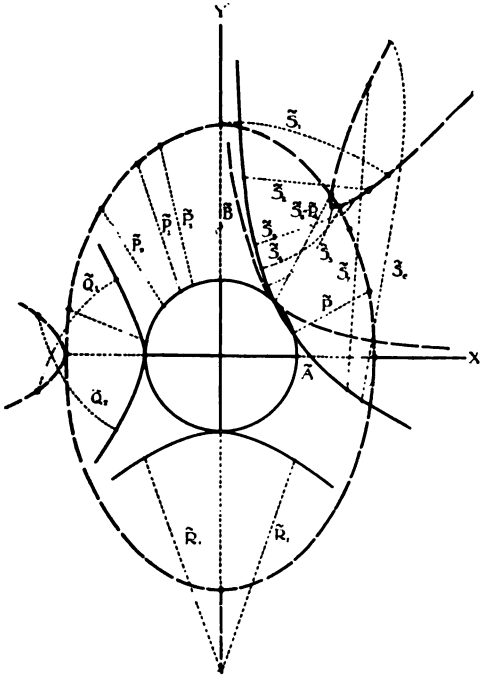

FIG. 47.

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The equation of the companions to the first circle referred to axes OX_1, OY_1, making an angle θ with the x- and y-axes is

$$\frac{\tilde{x}_1^2}{(a'+ia'')^2} - \frac{\tilde{y}_1}{(a''-ia')^2} = 1.$$

Thus the black hyperbola is

$$\frac{x_1^2}{a'^2} - \frac{y_1'^2}{a''^2} = 1,$$

while the blue one is

$$\frac{x_1^2}{(a'+a'')^2} - \frac{y_1^2}{(a''-a')^2} = 1.$$

Changing the a's to b's gives of course the corresponding curves for the other circle.

In the particular case chosen for the diagram, the six curves are

$$\frac{\tilde{x}_1^2}{(1+i)^2} - \frac{\tilde{y}_1^2}{(1-i)^2} = 1, \quad x_1'^2 - y_1'^2 = 1, \quad \eta_1^2 = 0;$$

$$\frac{\tilde{x}_2^2}{(1+2i)^2} - \frac{\tilde{y}_2^2}{(2-i)^2} = 1, \quad x_2'^2 - \frac{y_2'^2}{4} = 1, \quad \frac{\xi_2^2}{9} - \eta_2^2 = 1.$$

There is the further condition that, if (x_{11}, y_{11}) belongs to the first companion while (x_{12}, y_{12}) belongs to the second, then

$$\frac{\tilde{x}_1}{\tilde{x}_2} = \frac{\tilde{y}_1}{\tilde{y}_2} = \frac{1+i}{1+2i} = \frac{3-i}{5}.$$

This method is equivalent analytically to expressing the coördinates by a parameter $\tilde{\theta} = \theta' + i\theta''$. Thus,

$$\tilde{x} = \tilde{a}\cos\tilde{\theta}, \quad \tilde{y} = \tilde{b}\sin\tilde{\theta}.$$

Whence

$$\begin{aligned}
x' &= a'\cos\theta'\operatorname{ch}\theta'' + a''\sin\theta'\operatorname{sh}\theta'',\\
x'' &= -a'\sin\theta'\operatorname{sh}\theta'' + a''\cos\theta'\operatorname{ch}\theta'',\\
\xi &= (a'+a'')\cos\theta'\operatorname{ch}\theta'' + (a''-a')\sin\theta'\operatorname{sh}\theta'',\\
y' &= b'\sin\theta'\operatorname{ch}\theta'' - b''\cos\theta'\operatorname{sh}\theta'',\\
y'' &= b'\cos\theta'\operatorname{sh}\theta'' - b''\sin\theta'\operatorname{ch}\theta'',\\
\eta &= (b'+b'')\sin\theta'\operatorname{ch}\theta'' - (b''-b')\cos\theta'\operatorname{sh}\theta''.
\end{aligned}$$

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If we fix θ', while θ'' is allowed to vary, the black point (x', y') will move on the hyperbola

$$(b''x' \cos\theta' + a''y' \sin\theta')^2 - (b'x' \sin\theta' - a'y' \cos\theta')^2 = (a'b'' \cos^2\theta' + a''b' \sin^2\theta)^2,$$

while the blue point (ξ, η) is at the same time moving on

$$[(b'' - b')\xi \cos\theta + (a'' - a')\eta \sin\theta']^2 - [(b' + b'')\xi \sin\theta' - (a' + a'')\eta \cos\theta')]^2 = [(a' + a'')(b'' - b') \cos^2\theta'^2 + (a'' - a')(b' + b'') \sin^2\theta']^2.$$

Rearranging, these become, respectively,

$$(b''^2 \cos^2\theta' - b'^2 \sin^2\theta')x'^2 + 2(a'b' + a''b'') \sin\theta' \cos\theta' x'y' + (a''^2 \sin^2\theta' - a'^2 \cos^2\theta')y'^2 = a'^2b''^2 \cos^2\theta' + 2a'a''b'b'' \cos^2\theta \sin^2\theta + a''^2b'^2 \sin^2\theta',$$

and

$$[(b'^2 + b''^2)(\cos^2\theta' - \sin^2\theta') - 2b'b'']\xi^2 + 4(a'b' + a''b'') \sin\theta' \cos\theta'\xi\eta - [(a'^2 + a''^2)(\cos^2\theta' - \sin^2\theta') + 2a'a'']\eta^2 = [(a'b'' - a''b')(\cos^2\theta' - \sin^2\theta') + a''b'' - a'b']^2.$$

Considerable simplification results, of course, for θ' equal to an integral multiple of $\pi/2$.

If, on the other hand, we fix θ'' while θ' is allowed to vary, the black point will move on the ellipse

$$(b''x' \operatorname{sh}\theta'' + a'y' \operatorname{ch}\theta'')^2 + (b'x' \operatorname{ch}\theta'' - a''y' \operatorname{sh}\theta'')^2 = (a''b'' \operatorname{sh}^2\theta'' + a'b' \operatorname{ch}^2\theta'')^2,$$

while the blue point is moving on

$$[(b'' - b')\xi \operatorname{sh}\theta'' + (a' + a'')\eta \operatorname{ch}\theta']^2 + [(b' + b'')\xi \operatorname{ch}\theta'' - (a'' - a')\eta \operatorname{sh}\theta'']^2 = [(a'' - a')(b'' - b') \operatorname{sh}^2\theta'' + (a' + a'')(b' + b'') \operatorname{ch}^2\theta'']^2.$$

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Rearrangement gives, respectively,

$$(b'^2 \operatorname{ch}^2\theta'' + b''^2 \operatorname{sh}^2\theta')x'^2 + 2(a'b'' - a''b')\operatorname{ch}\theta''\operatorname{sh}\theta''x'y' + (a'^2\operatorname{ch}^2\theta'' + a''^2\operatorname{sh}^2\theta')y'^2 = a'^2b'^2\operatorname{ch}^2\theta' + 2a'b'a''b''\operatorname{ch}^2\theta'\operatorname{sh}^2\theta'' + a'^2b'^2\operatorname{sh}^4\theta'',$$

and

$$[(b'^2 + b''^2)(\operatorname{ch}^2\theta'' + \operatorname{sh}^2\theta')]\xi^2 + 2b'b'' + 4(a'b'' - a''b')\operatorname{ch}\theta''\operatorname{sh}\theta'\xi\eta + [(a'^2 + a''^2)(\operatorname{ch}^2\theta' + \operatorname{sh}^2\theta')]\eta^2 + 2a'a'' = [(a'b' + a''b'')^2(\operatorname{ch}^2\theta'' + \operatorname{sh}^2\theta'') + a'b'' + a''b']^2.$$

Every element belonging to the locus is the intersection of a curve pair $\theta' = \text{constant}$ with a curve pair $\theta'' = \text{constant}$. Thus.

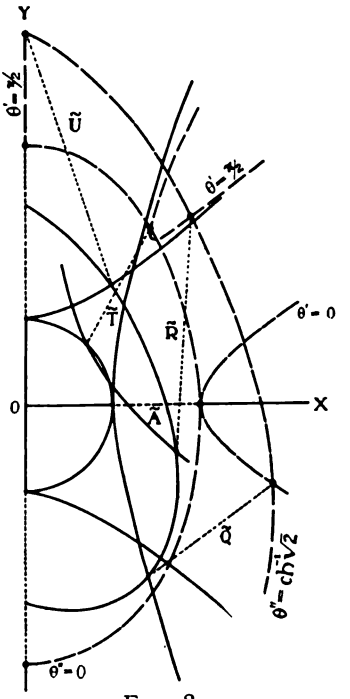

FIG. 48.

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in fig. 48, $\tilde{A}$, $\tilde{B}$, $\tilde{Q}$, $\tilde{R}$, $\tilde{T}$, $\tilde{U}$, are seen each to belong to two curve pairs.

The intersection with the line infinity is composed of the intersections of the asymptote pairs which again are the two involutions cut out by

$$\frac{\tilde{x}^2}{\tilde{a}^2} + \frac{\tilde{y}^2}{\tilde{b}^2} = 0.$$

Notice that for the asymptotes of a black hyperbola to coincide with the asymptotes of a corresponding blue hyperbola would require that the coefficients of the left members were proportional and so

$$a'^2 - a''^2 + 2a'a'' = b'^2 - b''^2 + 2b'b'' = 0,$$

which is independent of θ. Thus, if there is a single case of coincidence, for a given locus, there is always coincidence.

Not every pair of concentric ellipses can belong to such a system as that determined by

$$\frac{\tilde{x}^2}{\tilde{a}^2} + \frac{\tilde{y}^2}{\tilde{b}^2} = 1.$$

For in order that the pair

$$A_1x'^2 + 2Hx'y' + B_1y'^2 = C_1^2, \quad A_2\xi^2 + 4H\xi\eta + B_2\eta^2 = C_2^2,$$

should belong to the system, it is necessary that simultaneously we can have

$$A_1B_1 - H^2 = C_1^2 \quad \text{and} \quad A_2B_2 - 4H^2 = C_2^2.$$

This imposes one condition upon the ellipses. That condition satisfied, we have five equations in the five unknowns a', a'', b', b'', θ'', the equations, namely,

$$\begin{aligned}
b'^2 \operatorname{ch}^2\theta'' + b''^2 \operatorname{sh}^2\theta'' &= A_1,\\
a'^2 \operatorname{ch}^2\theta'' + a''^2 \operatorname{sh}^2\theta'' &= B_1,\\
(a'b'' - a''b') \operatorname{ch}\theta'' \operatorname{sh}\theta'' &= H,\\
(b'^2 + b''^2)(\operatorname{ch}^2\theta'' + \operatorname{sh}^2\theta'') + 2b'b'' &= A_2,\\
(a'^2 + a''^2)(\operatorname{ch}^2\theta'' + \operatorname{sh}^2\theta'') + 2a'a'' &= B_2.
\end{aligned}$$

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There is somewhat greater complication introduced if we suppose the conic

$$\frac{\tilde{x}^2}{\tilde{a}^2}+\frac{\tilde{y}^2}{\tilde{b}^2}=1$$

to be turned through the imaginary angle $i\phi$.

We then write

$$\tilde{x}\cos i\phi+\tilde{y}\sin i\phi=\tilde{x}\,\mathrm{ch}\,\phi+i\tilde{y}\,\mathrm{sh}\,\phi=\tilde{a}\cos\tilde{\theta}$$

and

$$-\tilde{x}\sin i\phi+\tilde{y}\cos i\phi=-i\tilde{x}\,\mathrm{sh}\,\phi+\tilde{y}\,\mathrm{ch}\,\phi=\tilde{b}\sin\tilde{\theta},$$

the equation of the conic becoming

$$\tilde{x}^2\left(\frac{\mathrm{ch}^2\phi}{\tilde{a}^2}-\frac{\mathrm{sh}^2\phi}{\tilde{b}^2}\right)+2i\tilde{x}\tilde{y}\,\mathrm{sh}\,\phi\,\mathrm{ch}\,\phi\left(\frac{1}{\tilde{a}^2}-\frac{1}{\tilde{b}^2}\right)+\tilde{y}^2\left(\frac{-\mathrm{sh}^2\phi}{\tilde{a}^2}+\frac{\mathrm{ch}^2\phi}{\tilde{b}^2}\right)=1.$$

When now θ'' is fixed we find, on elimination of θ', that (x',y') moves on

$$\begin{aligned}
&x'^2\{(b'^2\mathrm{ch}^2\theta''+b''^2\mathrm{sh}^2\theta'')\mathrm{ch}^2\phi+2(a'b'+a''b'')\mathrm{ch}\theta''\mathrm{sh}\theta''\mathrm{ch}\phi\mathrm{sh}\phi\\
&\quad+(a'^2\,\mathrm{sh}^2\theta''+a''^2\,\mathrm{ch}^2\theta'')\,\mathrm{sh}^2\phi\}\\
&\quad+2x'y'\{(a'b''-a''b'')\,\mathrm{ch}\,\theta''\,\mathrm{sh}\,\theta''+(a'a''+b'b'')\,\mathrm{ch}\,\phi\,\mathrm{sh}\,\phi\}\\
&\quad+y'^2\{(a'^2\,\mathrm{ch}^2\theta''+a''^2\,\mathrm{sh}^2\theta'')\,\mathrm{ch}^2\phi\\
&\quad+2(a'b'+a''b'')\,\mathrm{ch}\,\theta''\,\mathrm{sh}\,\theta''\,\mathrm{ch}\,\phi\,\mathrm{sh}\,\phi\\
&\quad+(b'^2\,\mathrm{sh}^2\theta''+b''^2\,\mathrm{ch}^2\theta'')\,\mathrm{sh}^2\phi\}\\
&\quad=\{(a'b'\,\mathrm{ch}^2\theta''+a''b''\,\mathrm{sh}^2\theta'')\,\mathrm{ch}^2\phi\\
&\quad+(a'^2+b'^2+a''^2+b''^2)\,\mathrm{ch}\,\theta''\,\mathrm{sh}\,\theta''\,\mathrm{ch}\,\phi\,\mathrm{sh}\,\phi\\
&\qquad\qquad+(a'b'\,\mathrm{sh}^2\theta''+a''b''\,\mathrm{ch}^2\theta'')\,\mathrm{sh}^2\phi\}^2.
\end{aligned}$$

The point (ξ,η) is at the same time moving on

$$\begin{aligned}
&\{(a'a''+b'b'')(\mathrm{ch}^2\theta''+\mathrm{sh}^2\theta'')(\mathrm{ch}^2\phi+\mathrm{sh}^2\phi)+a'b''+a''b'\\
&\quad+2(a'^2+b'^2+a''^2+b''^2)\,\mathrm{ch}\,\theta''\,\mathrm{sh}\,\theta''\,\mathrm{ch}\,\phi''\,\mathrm{sh}\,\phi'')\}^2\\
&\quad=\xi^2\{[(b'^2+b''^2)(\mathrm{ch}^2\theta''+\mathrm{sh}^2\theta'')+2b'b'']\,\mathrm{ch}^2\phi\\
&\quad+4(a'b'+a''b'')\,\mathrm{ch}\,\theta''\,\mathrm{sh}\,\theta''\,\mathrm{ch}\,\phi\,\mathrm{sh}\,\phi
\end{aligned}$$

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$$+[(a'^2+a''^2)(\mathrm{ch}^2\theta''+\mathrm{sh}^2\theta'')-2a'a'']\,\mathrm{sh}^2\phi\}$$
$$+2\xi\eta\{2(a'b''-a''b')\,\mathrm{ch}\,\theta''\,\mathrm{sh}\,\theta''$$
$$+(a''^2-a'^2-b''^2+b'^2)\,\mathrm{ch}\,\phi\,\mathrm{sh}\,\phi\}$$
$$+\eta^2\{[(a'^2+a''^2)(\mathrm{ch}^2\theta''+\mathrm{sh}^2\theta'')+2a'a'']\,\mathrm{ch}^2\phi$$
$$+4(a'b'+a''b'')\,\mathrm{ch}\,\theta''\,\mathrm{sh}\,\theta''\,\mathrm{ch}\,\phi\,\mathrm{sh}\,\phi$$
$$+[(b'^2+b''^2)(\mathrm{ch}^2\theta''+\mathrm{sh}^2\theta'')-2b'b'']\,\mathrm{sh}^2\theta]\}.$$

In these more general equations the coefficient of $\xi\eta$ is no longer a mere multiple of that of xy, and the condition that the square of the discriminant of the left member should equal the opposite of the constant term can be satisfied independently for the two ellipses. The six unknowns a', b', a'', b'', θ'', ϕ are then connected by six independent[1] equations. Thus any two ellipses with center at origin and which will give real values for these unknowns can belong to the system.

In this most general case, as in the simpler ones formerly considered, we can have the black ellipse and the blue ellipse simultaneously described by motions which are composed of two simple harmonic motions; the motions, in fact for θ' varying uniformly with the time, are given by

$$x'=\cos\theta'\,(a'\,\mathrm{ch}\,\theta''\,\mathrm{ch}\,\phi+b'\,\mathrm{sh}\,\theta''\,\mathrm{sh}\,\phi)$$
$$+\sin\theta'\,(a''\,\mathrm{sh}\,\theta''\,\mathrm{ch}\,\phi+b''\,\mathrm{ch}\,\theta''\,\mathrm{sh}\,\phi),$$
$$y'=\cos\theta'\,(-b''\,\mathrm{sh}\,\theta''\,\mathrm{ch}\,\phi-a''\,\mathrm{ch}\,\theta''\,\mathrm{sh}\,\phi)$$
$$+\sin\theta'\,(b'\,\mathrm{ch}\,\theta''\,\mathrm{ch}\,\phi+a'\,\mathrm{sh}\,\theta''\,\mathrm{sh}\,\phi),$$

and

$$\xi=\cos\theta'\,(a'+a'')\,\mathrm{ch}\,\theta''\,\mathrm{ch}\,\phi+(b'+b'')\,\mathrm{sh}\,\theta''\,\mathrm{sh}\,\phi)$$
$$+\sin\theta'\,[(a''-a')\,\mathrm{sh}\,\theta''\,\mathrm{ch}\,\phi+(b''-b')\,\mathrm{ch}\,\theta''\,\mathrm{sh}\,\phi),$$
$$\eta=\cos\theta'\,[(b'-b'')\,\mathrm{sh}\,\theta''\,\mathrm{ch}\,\phi+(a'-a'')\,\mathrm{ch}\,\theta''\,\mathrm{sh}\,\phi)$$
$$+\sin\theta'\,[(b'+b'')\,\mathrm{ch}\,\theta''\,\mathrm{ch}\,\phi+(a'+a'')\,\mathrm{sh}\,\theta''\,\mathrm{sh}\,\phi).$$

The elimination of θ' from these equations gives the foregoing equations of the black ellipse and the corresponding blue ellipse. If from the same equations we eliminate θ'' we get a pair of hyperbolas.

[1] The Jacobian does not vanish, as can be seen by substituting therein special values for the unknown.

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The black one is

$$\begin{vmatrix} x', b' \cos\theta' \operatorname{sh}\phi + a'' \sin\theta' \operatorname{ch}\phi \\ y', -b'' \cos\theta' \operatorname{ch}\phi + a' \sin\theta' \operatorname{sh}\phi \end{vmatrix}^2$$

$$- \begin{vmatrix} a' \cos\theta' \operatorname{ch}\phi + b'' \sin\theta' \operatorname{sh}\phi, x' \\ -a'' \cos\theta' \operatorname{sh}\phi + b' \sin\theta' \operatorname{ch}\phi, y' \end{vmatrix}^2$$

$$= \begin{vmatrix} a' \cos\theta' \operatorname{ch}\phi + b'' \sin\theta' \operatorname{sh}\phi, & b' \cos\theta' \operatorname{sh}\phi + a'' \sin\theta' \operatorname{sh}\phi \\ -a'' \cos\theta' \operatorname{sh}\phi + b' \sin\theta' \operatorname{ch}\phi, & -b'' \cos\theta' \operatorname{ch}\phi + a' \sin\theta' \operatorname{sh}\phi \end{vmatrix}^2$$

or, say,

$$(Dx' - Cy')^2 - (-Bx' + Ay')^2 = (AD - BC)^2.$$

The blue one can be similarly written down from the equations for ξ and η. Or what is the same thing, in the A, B, C, D for a', a'', b', b'' substitute respectively, $a' + a''$, $a'' - a'$, $b' + b''$, $b'' - b'$ and for (x', y'), (ξ, η).

Somewhat less interesting are the non-central conics unless we except those in which the terms of the second degree are the square of a circular ray. For then, just as the square equated to a constant represents two lines making any angle you please with each other; so, when the same square is equated to a linear expression the resulting locus may be regarded either as a parabola or as an ellipse whose imaginary asymptotes make any real angle you please with each other.

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The Erysiphaceae of Nebraska

BY RAYMOND J. POOL

INTRODUCTION

The Erysiphaceae are parasitic fungi which are popularly known as "Powdery Mildews," "Blights," or "Leaf Mildews." They are easily recognized by the white or colorless, more or less dusty or felt-like covering on leaves, stems, or other infected parts. They are common on many of our common garden and field plants, as well as on many pieces of "wild" or non-cultivated plants. The dusty appearance is due mostly to the presence of myriads of colorless or white conidiospores which are characteristic of the "Oidium" or conidial stage in the development of any given species. Later in the summer, or autumn, the ascigerous form of fruit is developed which is in the shape of small, more or less globular, dark brown or black perithecia. The perithecia are usually provided with special outgrowths, the appendages. After the perithecia are formed the mycelium sometimes disappears, and the black perithecia are left on the surface of the leaves or stems of the host; sometimes the mycelium is thick and persistent on the host and then the perithecia are more or less immersed in the patches of cobwebby mycelium.

The Erysiphaceae belong to the Ascomycetes, and they are further classified under various orders by different writers. Thus we find that they are given the rank of a family or a sub-family under the Order Perisporiales, Pyrenomycetales, or Sphaeriales. Fortunately plants are not changed by simply changing their name or the name of the group, or by transferring them from one group to another. The Order Sphaeriales is perhaps the best name for the order which includes the plants in question.

The Erysiphaceae are characterized by the truly parasitic type of nutrition, the production of large, hyaline, non-septate conidia

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in great abundance on simple, erect sporophores, the small globose indehiscent perithecia (cleistocarps) provided with appendages of definite form, containing asci with large, non-septate spores.

Structure and Round of Life

The mycelium consists of many delicate, silky, white or colorless or sometimes brownish filaments or hyphae with many cross partitions at rather long intervals. The hyphae are often branched and interwoven so that a more or less densely tangled and felt-like mycelium is produced in many species. In all the genera except *Phyllactinia,* hyphae of the vegetative mycelium produce off-shoots at intervals which pierce the outer walls of the host cells and swell into bladder-like structures (Plate II, figs. 16–17), haustoria, in the epidermal cells. The function of these haustoria is double, to attach the fungus to the host and to serve as absorbing organs which draw nutrient material from the epidermal cells and pass it out to the external mycelium upon which the conidia and perithecia are formed. However, in the genus *Phyllactinia* we have an interesting and important difference in the matter of the formation of the haustoria. In this genus haustoria are not sent into the epidermal cells of the host, but instead special hyphal branches, of limited growth, are developed which enter the host tissue by way of the stomata. Once inside, these branches wind about in the inter-cellular air spaces and finally send haustoria into the surrounding cells. These special hyphae consist usually of more than one cell (up to three or rarely more), but in all cases the haustorium is produced by the last cell of the filament. The haustorium itself is similar to the haustoria of the other genera of the Erysiphaceae. With the exception of these special branches and of the haustoria, the mycelium of all our species in the group is external to the tissues of the host.—However Salmon in his studies on the group has pointed out that in *Erysiphe taurica* the mycelium which produces the conidiospores is endophytic, and the conidiophores emerge singly or in groups through the stomata. The conidiophores are also sometimes branched, another char-

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acter which does not exist elsewhere in the family. In the later stages of the conidia production mycelial hyphae emerge in great numbers from the stomata, and form an external mycelium on the surface of the leaf very similar to the mycelium of the other species of the group. Upon this mycelium the perithecia are developed. On account of these peculiarities, Salmon considers that *Erysiphe taurica* differs generically from the other members of the group, and he has given the name *Oidiopsis* to this particular form. He also proposed a new sub-family, Oidiopsidae, for the reception of this genus.

There are two kinds of reproductive bodies formed in the Erysiphaceae, the asexually-produced conidia or conidiospores, and the ascopores formed in perithecia. The conidia are formed under the favorable conditions prevailing throughout the summer and early autumn. From the mycelium arise erect, simple hyaline or white branches which are very delicate, thin-walled, one- to many-septate, and about 10μ thick and from 120–380μ high. The conidia are formed at the tips of these branches (Plate I, fig. 2) either singly or in long chains in basipetal succession. The conidia are continuous, colorless or white, oblong, cylindrical or barrel-shaped, smooth, thin-walled and 18–50 $\times$ 9–25μ in size.

The conidia are formed in immense numbers throughout the summer. They are easily carried by the wind, and are capable of immediate germination (Plate I, fig. 3) on reaching a suitable host. The conidia are therefore excellent devices for the rapid spread of the fungus during the growing season.

These conidial forms were formerly classified as separate species of the genus *Oidium,* a supposed autonomous genus of the hyphomycetes. By the researches of Berkeley and Tulasne from 1840–1855 it was proved that an organic connection exists between the mycelium which produces the conidia and that which later in the season bears the ascigerous fruits.

The second kind of reproductive body of the Erysiphaceae is formed and matured much later in the autumn, at a time when the general tone of the host plant is on the decline. The conidia

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give way to the perithecia containing ascospores (Plate I, figs. 11–12) which are more resistent to the unfavorable conditions which obtain at the final death of the host or with the approach of leaf fall and the assumption of the resting state by the host.

De Bary first worked out the history of the development of the perithecium. At the point of contact of two hyphae a lateral branch is formed on each hypha, each of which is soon cut off from its mother hypha by a septum (Plate I, fig. 4); or the two branches are formed by the tips of two adjacent hyphae which come in contact and from the tip of each the septum cuts off a cell. One of these branches or lateral cells gradually enlarges until it is oval-oblong in shape, and becomes the oögone (Plate I, fig. 5). The other branch lengthens and becomes closely fixed to the wall of the oögone (Plate I, fig. 5) curving over so that its apex lies on the tip of the oögone. A cell is then cut off from the upper extremity of the smaller branch (Plate I, fig. 6) which becomes this antherid.

The common wall between oögone and antherid soon becomes dissolved and the nucleus of the antherid passes into the oögone and there fuses with the nucleus of that cell (Plate I, fig. 7). This conjugation marks the beginning of the development of the perithecium. In fact at about this time the development of the walls of the future perithecium begins. From the stalk cell of the fertilized oögone (the carpogone) branches grow upward and closely inclose the carpogone with a single layer of cells (Plate I, fig. 8). After the stalk cell has enlarged somewhat a second layer of cells (Plate I, fig. 9) interior to the first layer is added to the covering of the carpogone. By copious branching and intertwining the hyphae of both series become grown together forming a well-defined pseudoparenchymatous tissue of several layers in thickness about the young perithecium. The outer layers of cells become flattened (Plate I, fig. 11), lose their protoplasmic contents, become brown or nearly black in some cases and constitute the outer wall of the perithecium. The cells of the inner layer remain soft and eventually most of them disappear during the formation of the ascus or the asci.

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While the two primary wall layers are being formed, a row of from three to six cells (Plate I, fig. 10) is formed by the elongation and the division of the carpogone. In the penultimate cell of this row there are two nuclei which soon fuse. Then this cell, which is to become the ascus, rapidly increases in size (Plate I, fig. 10), absorbs the apical cell and many of the surrounding cells, its fusion nucleus divides to form the spores (Plate I, fig. 11), and finally the ascus with its contained spores becomes mature. In the poly-ascus genera the sequence in this process is essentially as has been given above. The only marked variation is of course seen in the formation of more than one ascus upon the division of the carpogone, a detail which need not be considered in this place.

The asci are colorless sacks. They are sessile or often somewhat pedicellate, globose, ovate, or cylindrical in shape (Plate I, fig. 12) and from one to sixty or more in number. They contain from two to eight spores which are also colorless. The spores are continuous, with granular contents, oval or oblong, and $15–34 \times 8–25\mu$ in size. Sometimes the ascospores do not ripen until the spring following their first appearance upon the host. They are incapable of immediate germination, apparently demanding a resting stage of several months duration before they will germinate. The germination of the ascospores (Plate I, fig. 1) and the development of the mycelium from them is very similar to that process in the case of the conidia. Because of the rather low percentage of germination of the ascospores they are not nearly so effective in the rapid spread of the fungus as are the conidia. The appendages on the perithecium are merely extensions of certain cells in the outer wall (Plate I, fig. 11) of the perithecium. Sometimes the perithecia when crushed emit instead of the usual contents, a stream of small oblong spores $6.5–10 \times 3.5–6\mu$ in size, immersed in a colorless granular material. In such cases there may usually be found on the same mycelium smaller perithecia-like bodies which are oval or pyriform in shape and which contain the same kind of spores. These are the fruits and spores of an imperfect fungus, *Ampelomyces*

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quisqualis Caseti., which is parasitic upon the mildew. Sometimes the perithecia are filled with the fruits of the parasite to the exclusion of the asci. This parasite apparently attacks all of the species in the group, and when abundant probably serves in a measure to check the development of the particular mildew infected. It is possible that the vitality of the mildew is so lessened by such an attack that its spread is considerably checked.

The Erysiphaceae are of considerable economic importance as plant diseases. In some localities they become quite destructive. The pathological phase of the group is left for the plant pathologist. Suggestions along this line with directions for their prevention or control may be found in many Agricultural Experiment Station publications, and in more extensive treatises on plant pathology in general.

ERYSIPHACEAE Lev.

Fungi parasitic on seed plants; epiphytic or partially endophytic; mycelium white, or in some cases becoming brownish; haustoria formed in the epidermal cells from external hyphae, or within deeper lying cells from special hyphal branches sent through the stomata into the intercellular air spaces; hyphae thin-walled, septate, much branched and interwoven; conidia large, continuous, hyaline, cylindrical, oblong, or barrel-shaped, produced singly or in chains on erect, simple, septate, colorless sporophores; perithecia on the mycelium, at first colorless, then yellow to brown, finally black, membranous or carbonous, without an ostiole, globose or globose-depressed, sometimes becoming lenticular or concave; asci one to many, arising from the base of the perithecium, colorless, cylindrical, oblong, ovate, or globose, frequently pedicellate, 2–8-spored; spores continuous, colorless, oblong or oval, straight or slightly curved.

KEY TO THE GENERA

I. Perithecia containing a single ascus; asci mostly 8-spored.
   1. Appendages dichotomously branched at the tip.... *Podosphaera*
   2. Appendages simple or obscurely branched..... *Sphaerotheca*

II. Perithecia containing several asci; asci 2–8-spored.
   3. Appendages acicular, bulbous at the base..... *Phyllactinia*
   4. Appendages uncinate or coiled at the tip..... *Uncinula*
   5. Appendages dichotomously branched at the tip..... *Microsphaera*
   6. Appendages simple or obscurely branched..... *Erysiphe*

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PODOSPHAERA Kunze.

Perithecia globose or somewhat flattened; ascus globose to obovate; spores eight; appendages confined to a small apical group or scattered over the upper half of the perithecium, dichotomously branched at the tip, branches simple and straight, or more commonly in our species swollen and knob-like.

KEY TO THE SPECIES

I. Appendages of one kind.
   1. Appendages more or less scattered over the upper half of the perithecium ..... *P. oxyacanthae*
   2. Appendages confined to a small group near the apex of the perithecium ..... *P. tridactyla*

II. Appendages of two kinds..... *P. leucotricha*

PODOSPHAERA OXYACANTHAE (DC.) De Bary.

Erysiphe oxyacanthae DC.
Podosphaera kunzei Lev.

Amphigenous; mycelium variable, persistent in patches, or wholly evanescent; perithecia scattered, or more or less clustered in close groups, sub-globose, 60–90μ in diameter, cells 10–18μ wide; appendages spreading, sometimes equatorially placed, 5–30 in number and from $\frac{1}{2}$ — 10 times the diameter of the perithecium, dark brown for about half their length, septate, tips 2–4 times dichotomously branched, branches usually short and equal, ultimate branches swollen and more or less knob-like, ascus broadly obovate, oblong, or globose, variable in size 58–90 × 45–75μ, thick-walled; spores 8, variable in size 18–30 × 10–17μ.

On: *Amelachier botryapium, Prunus americana, P. besseyi, P. cerasus, P. demissa, P. serotina, P. virginiana.*

Bloomington, Crete, Ewing, Grand Island, Johnstown, Lincoln, Long Pine, Spencer, Naponee, Wabash, Weeping Water, Orleans, Valentine, Callaway, Red Cloud.

This is our most common mildew on wild and cultivated forms of *Prunus.* On *Prunus cerasus* the perithecia are usually hypophyllous, but on the other hosts they are usually epiphyllous or amphigenous.

PODOSPHAERA TRIDACTYLA (Wallr.) De Bary.

Alphitromorpha tridactyla Wallr.
Podosphaera kunzei Lev. (partim)

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Erysiphe tridactyla Tul.

Amphigenous; mycelium evanescent, sometimes sub-persistent; perithecia scattered, or more or less gregarious, sub-globose, 70–100 μ in diameter, cells 10–15 μ wide; appendages 3–10, usually only 4–5, springing in a cluster from the apex of the perithecium, more or less erect, septate, tips 3–5 times dichotomously branched primary branches elongated, ultimate branches rounded or more or less knob-like; ascus globose, 60–80 × 60–70μ ; spores 8, 20–30 × 12–15μ.

On: *Prunus americana, P. cerasus.*
Lincoln, Wabash, Weeping Water, York.

The apical insertion of the more or less erect appendages is the character which usually separates this species from *P. oxyacanthae.* It is a question whether this is sufficient ground for making a species for the form, and I have had some hesitation in assigning specific rank to *P. tridactyla* since it is usually regarded as a variety of *P. oxyacanthae.* Salmon regards it as a variety of the latter, and remarks: "The published records of *Podosphaera tridactyla* (Wallr.) from America almost certainly all belong to *P. oxyacanthae,* as the former name has been in error, commonly used by American mycologists as a synonym of the latter species." However the two forms seem sufficiently different to warrant the above treatment in this place. The two forms should be studied further from local material.

PODOSPHAERA LEUCOTRICHA (Ell. & Ever.) Sal.

Sphaerotheca leucotricha Ell. & Ever.
Sphaerotheca mali Burrill.

Amphigenous; mycelium persistent on the young stem, the petioles, and leaves, effused; perithecia densely gregarious, rarely scattered, 75–90μ in diameter, cells 10–16μ wide; appendages of two kinds, the apical ones 3–11, 4–7 times the diameter of the perithecium, becoming thick-walled, dark brown in the lower half, pale toward the tip, tip undivided or blunt, rarely once or twice dichotomously divided; basal appendages short, tortuous, pale brown, simple, or irregularly branched; ascus oblong to sub-globose 55–70 × 44–50μ; spores 22–26 × 12–14μ.

On: This species is reported by Heald in the nineteenth annual report of the Nebraska Agricultural Experiment Station

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as occurring on *Malus malus*. In other sections it attacks seedlings in the nursery and at such times often causes damage of considerable extent. Nurserymen should watch for its appearance, and adopt means for its control should it become troublesome.

Sphaerotheca Lev.

Perithecia sub-globose; ascus ovate, globose, or elliptical; spores eight; appendages floccose, not much different from the mycelium, often closely interwoven with the mycelium, brown or colorless, simple or obscurely branched. In some species (*S. pannosa*) thick-walled, interwoven hyphae form a persistent pannose covering for the more or less immersed perithecia.

KEY TO THE SPECIES

I. Mycelium persistent, thick; perithecia more or less immersed in dense patches of the mycelium.
   1. Mycelium shining, white to pale brown..... *S. pannosa*
   2. Mycelium dark brown, hyphae tortuous..... *S. mors-uvae*

II. Mycelium evanescent, not thick and dense, or sometimes more or less persistent.
   3. Perithecia scattered or densely gregarious..... *S. humuli*

Sphaerotheca pannosa (Wallr.) Lev.

Alphitromorpha pannosa Wallr.
Erysiphe pannosa Fr.

Mycelium persistent on the stem calyx, petioles, and sometimes on the mid-ribs of the leaves in dense satiny patches, at first shining white, then gray to buff or light brown, composed of densely interwoven thick-walled hyphae; perithecia more or less, or completely immersed in the persistent mycelium, globose to sub-pyriform, 80–120μ in diameter, usually about 100μ, cells obscure, about 12μ wide; appendages few, sometimes lacking altogether, very short, tortuous, septate, pale brown; ascus broadly oblong to globose, 85–115μ, averaging 100 × 60–70μ; spores 8, 20–27 × 12–15μ.

On: *Amygdalus persica, Bidens cernua, Rosa arkansana, R. multiflora, Taraxacum taraxacum*

Lincoln, Pleasant Dale, Red Cloud, Roca, Weeping Water.

This species has been quite commonly confused with *S. humuli*. The present species is however quite well set off from all other

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species of the genus by its pannose, satiny patches of persistent mycelium in which the perithecia are usually completely immersed. *S. pannosa* is our very common "rose mildew." It occurs commonly upon the leaves of various wild species and cultivated varieties. Those plants growing in moist or shady situations are most commonly infected. The disease is rarely destructive to any degree with us, but may become so under especially favorable conditions.

SPAEROTHECA MORS-UVAE (Schwein.) B. & C.

Erysiphe mors-uvae Schwein.
Sphaerotheca pannosa Lev.

Amphigenous; mycelium persistent, when mature forming dense patches composed of sparingly branched, more or less flexuous, brown hyphae, becoming dark brown and thick-walled; perithecia gregarious, more or less immersed in the persistent mycelium, sub-globose, 75–110μ in diameter, cells large, at first well defined then becoming obscure, usually about 15–20μ; appendages usually few, pale brown, short and tortuous, sometimes more numerous and longer, up to five times the diameter of the perithecium; ascus elliptical to sub-globose, 70–92 $\times$ 50–62μ; spores 20–25 $\times$ 12–15μ.

On: *Ribes aureum, R. floridum, R. grossulariae, R. rotundifolium.*

Anselmo, Calloway, Grand Island, Lincoln, Loup City, St. Paul, Weeping Water, Wood River.

This species may become of considerable importance as a disease of cultivated gooseberries and currants during especially favorable seasons.

SPHAEROTHECA HUMULI (DC.) Burrill.

Erysiphe humuli DC.
Sphaerotheca pruinosa C. & P.
Sphaerotheca castagnei Lev. (partim).

Amphigenous; mycelium usually evanescent, rarely forming white, orbicular or irregular patches on the upper surface of the leaf; perithecia scattered or somewhat gregarious, or caespitose, 55–120μ in diameter, cells small, averaging 15μ wide; appendages very variable, few to numerous, usually long, often nine times the diameter of the perithecium, more or less straight, sep-

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tate and colored dark brown throughout, but sometimes short, tortuous, inter-woven and pale brown, sometimes lacking entirely; ascus broadly elliptical to sub-globose, rarely short-pedicellate, 45–90 × 50–75μ; spores 8, 20–25 × 12–18μ; averaging 22 × 15μ.

On: *Agrimonia hirsuta, Bidens frondosa, B. levis, Geum canadense, Gilia linearis, Rhus glabra, Senecio fremontii, Taraxacum taraxacum.*

Chadron, Cowles, Crete, Grand Island, Hastings, Lincoln, Long Pine, Ord, Red Cloud, Roca, Valentine, Weeping Water.

As here treated this species includes the variety *S. humili fulginea* (Schlecht) Salmon. This variety is about as common as the species. It is distinguished from the species by the larger cells of the outer wall of the perithecium which are about 20–30 wide, while in *S. humili* they are 10–20μ. This parasite which occurs on *Humulus lupulus* in Europe sometimes causes great loss to hop growers. It has been found on this host in America, but has not been reported on this host in Nebraska.

Phyllactinia Lev.

Perithecia large, globose-flattened to lenticular; asci 2- or sometimes 3-spored; appendages few, equatorial, rigid, acicular, with a bulbous inflation at the base. Sometimes a sub-family is made to take this genus as separated from the other genera of the family. In Phyllactinia branches of the mycelium pass through the stomata into the intercellular air spaces and from these branches haustoria are sent into the neighboring cells. In all the other genera the haustoria are confined to the epidermal cells. The genus is represented by a single species.

Phyllactinia corylea (Pers.) Karst.

Phyllactinia guttata (Wallr.)Lev.
Phyllactinia suffulta (Rebent.) Sacc.

Usually hypophyllous, though with us rather commonly amphigenous; mycelium evanescent or sometimes persistent; perithecia usually widely scattered, but now and then gregarious, very large, 150–280μ, globose-depressed to lenticular, cellular structure obscure, cells 15–20μ wide; appendages few, usually five to fifteen, usually equatorial, easily broken off, hyaline, aseptate, swollen at the base into a hollow bulb; asci 4–8, sometimes more, ovate or oblong 60–105 × 25–40μ, more or less pedicel-

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late; spores 2, rarely 3 or 4, variable in size, usually large, sometimes curved, 30–42 × 16–25μ.

On: *Aralia nudicaulis, Celastrus scandens, Cornus stolonifera, Fraxinus lanceolata, Ostrya virginiana, Xanthoxylum americanum.*

Ashland, Crete, Florence, Fort Niobrara, Gordon, Lincoln, Long Pine, Omaha, Saltillo, Wabash, Weeping Water, Valentine.

This species is very readily recognized by the larger perithecia which are very commonly lens-shaped, with a fringe of clear appendages with inflated bases.

Uncinula Lev.

Perithecia globose to globose-flattened; asci several, 2–8-spored; appendages simple and free from the mycelium, recurved or coiled at the tip.

KEY TO THE SPECIES

I. Appendages colored for more than half their length.
   1. Asci 4–6, 4–7-spored, appendages variable, 6–35.. *U. necator*
II. Appendages colorless for their whole length.
   2. Asci 8–20, 2-spored, appendages 50–125..... *U. macrospora*
   3. Asci 8–15, 4–6-spored, appendages 100–150..... *U. salicis*
   4. Asci 10–26, 7–8-spored, appendages densely crowded, *U. circinata*

Uncinula necator (Schwein.) Burrill

Erysiphe necator Schwein.
Uncinula spiralis B. & C.
Uncinula ampelopsidis Peck.

Amphigenous; mycelium sub-persistent, thin and effused, or forming circumscribed patches, sometimes evanescent; perithecia usually epiphyllous or sometimes hypophyllous as well, occasionally on the inflorescence of the host, globose-depressed, more or less scattered, 70–128μ in diameter, averaging 98μ, cells distinct, irregular in shape, 10–20μ wide; appendages very variable in number and length, 6–35, one to four times the diameter of the perithecium, smooth, simple, septate, thin-walled, light or dark brown in the lower half, tip helicoid when mature; asci 4–6, ovate or ovate-oblong to sub-globose 50–60 × 30–40μ; spores 4–7, 18–25 × 10–12μ.

On: *Parthenocissus quinquefolia, Vitis cordifolia, V. riparia, V. sps.*

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Crete, Florence, Lincoln, Saltillo, Weeping Water.

Uncinula macrospora Peck

Uncinula intermedia B. & C.

Amphigenous; mycelium evanescent or sub-persistent, and pruinose, sometimes forming circumscribed patches on the upper surface of the leaf; perithecia closely gregarious in small patches, or scattered over the surface, globose-depressed or lenticular, 95–165μ in diameter, averaging 130μ, cells about 10μ wide; appendages numerous, 50–130 or more, varying in length from one-third the diameter of the perithecium to a little more than its diameter, smooth, colorless, aseptate, simple, thick-walled at the base, tip usually simply uncinate; asci 8–20, sub-pryiform or elliptic oblong, often curved, 54–65 × 29–35μ; spores 2, 30 × 15–18μ.

On: *Ulmus americana.*

Crete, Elmwood, Grand Island, Lincoln, Nehawka, Plattsmouth, Roca, Saltillo, Union, Wabash, Weeping Water.

Uncinula salicis (DC.) Winter

Erysiphe salicis DC.
Uncinula adunca Lev.

Amphigenous; mycelium evanescent, or persistent in thin effused areas or sometimes densely compacted in definite circumscribed patches; perithecia gregarious, or more or less scattered, globose-depressed or lenticular, 90 × 175μ in diameter, averaging 135μ, cells 10–15μ wide; appendages numerous, often densely crowded, 100–150 or more, three-fourths to one and one-half times the diameter of the perithecium, simple, aseptate, or occasionally 1-septate at the base, hyaline and thin-walled throughout, tip simply uncinate; asci 8–14, rarely only 4–6, elliptic-oblong or broadly ovate, usually pedicellate, 50–80 × 30–40μ, averaging 68 × 36μ; spores 4–6, 20–26 × 10–15μ.

On: *Salix amygdaloides, S. cordata, S. fluviatalis, S. humulis, S. nigra, S. sp., Populus deltoides*

Ashland, Crete, Lincoln, Long Pine, Milford, Valentine, Wabash, Weeping Water.

Uncinula circinata Cook & Peck

Hypophyllous or sometimes with us amphigenous; mycelium evanescent or sub-persistent on the upper surface of the leaf, sometimes forming definite spots; perithecia usually scattered,

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sometimes gregarious, globose-lenticular, 160–225μ in diameter, averaging 190μ, cells obscure, irregular, 10 × 14μ wide; appendages very numerous, usually densely crowded, a little shorter than the diameter of the perithecium, simple, smooth, aseptate, thin-walled and hyaline throughout, tip simply uncinate; asci 10–26, usually about 15, narrowly ovate or cylindrical, with or without a short pedicel, 68–86 × 29–40μ; spores 8, 18–22 × 10–14μ.

On: *Acer saccharinum.*
Burwell, Crete, Lincoln, Wabash, Weeping Water.

Sometimes the appendages in this species are scarcely if at all uncinate and are more or less irregular. Perithecia with appendages of this nature are about as common with us as those with the typical form. Such specimens might possibly be mistaken for those of a species of *Erysiphe.*

Microsphaera Lev.

Perithecia globose to globose-flattened; asci several, two to eight spored; appendages free from the mycelium, branched at the tip in a definite manner, usually several times dichotomously divided and very often ornate.

KEY TO THE SPECIES

I. Appendages much contorted and angular, branches very irregular and flexuous ..... *M. euphorbiae*
II. Appendages not as above.
1. Appendages regularly dichotomous, tips recurved. *M. alni*
2. Appendages openly dichotomous, colored, tips not recurved, *M. russellii*
3. Appendages colorless, not penicillate.
1) Branches lax, irregular, ultimate branches long, *M. diffusa*
2) Branches closer, regular, ultimate branches short, *M. grossulariae*

Microsphaera euphorbiae (Peck) B. & C.

Erysiphe euphorbiae Peck.

Amphigenous; mycelium usually sub-persistent, thin and effused, sometimes evanescent; perithecia often gregarious in floccose patches, sometimes scattered, 85–145μ in diameter, rarely 180μ globose-depressed, cells 10–15μ wide; appendages 7–28, 2½–8 times the diameter of the perithecium, always flexuous and no-

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dose, colorless aseptate, tip 3–4 times dichotomously branched, branching very irregular and lax, branches strongly flexuose, often more or less curled, tips of ultimate branches straight or curved; asci 4–13, rarely more, ovate or ovate-oblong, with a short pedicel, 48–66 × 26–35μ; spores usually 4, sometimes only 3, or sometimes 5–64, 19–21 × 10–12μ.

On: *Euphorbia marginata.*
Cass County, Red Cloud, Riverton.

MICROSPHAERA *alni* (Wallr.) Winter.

Alphitromorpha alni Wallr.
Microsphaera quercina (Schwein.) (Burrill) (partim).

Amphigenous; mycelium evanescent or persistent in thin, more or less effused areas over the surface of the leaf; perithecia scattered or more or less densely gregarious, globose-depressed, very variable in size, usually small, 66–110μ in diameter, sometimes 110–135μ, cells 10–15μ wide; appendages very variable in number and length, 4–26, ⅓ to 2½ times the diameter of the perithecium, colorless throughout or more or less amber colored at the base, aseptate or sometimes 1–2-septate toward the base, tip more or less closely 3-6 times dichotomously branched, tips of the ultimate branches regularly and distinctly recurved; asci 3–8, ovate to ovate-oblong, or globose, 42–70 × 32–50μ, usually pedicellate; spores 4–8, 18–23 × 10–12μ.

On: *Lathyrus odoratus, Lonicera glaucescens, Quercus macrocarpa, Q. rubra, Syringa vulgaris, S. chinensis.*
Ashland, Florence, Long Pine, Loup City, Lincoln, Wabash, Weeping Water, St. Paul, Riverton.

MICROSPHAERA ALNI var. vaccinii (Schwein.) Salmon.

Microsphaera elevata Burrill.
Erysiphe vaccinii Schwein.

Generally epiphyllous; mycelium persistent or sometimes evanescent; perithecia globose or globose-depressed, very variable in size, 70–145μ in diameter, cells 10–20μ wide; appendages 4–22, 2½ times the diameter of the perithecium, delicate and thin, hyaline or occasionally amber-brown at the base, 2–4 times dichotomously branched, branching variable, irregular, sometimes close and compact, sometimes loose and widely forked, ultimate branches recurved; asci 2–16, 45–72 × 28–38μ; spores 4–6, 18–22 × 10–13μ.

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On: *Catalpa catalpa, C. speciosa.*
Lincoln, Wabash, Weeping Water.

This variety is an extremely variable form. It occurs in the east on species of *Vaccinium,* and on *Epigaea.* Salmon writes in regard to the form: "On the whole, the present plant appears clearly marked off from typical *M. alni* by the long, flaccid appendages, and their usually more irregularly branched apex." The perithecia are usually smaller than in *M. alni.*

MICROSPHAERA RUSSELLII Clinton.

Amphigenous; mycelium evanescent or sub-persistent, usually inconspicuous; perithecia scattered, 70–118μ in diameter, globose-depressed, cells small, 6–14μ wide appendages 5–14, 3–7 times the diameter of the perithecium, flaccid septate, smooth, colored nearly to the tip when mature, tip 2–4 times dichotomously divided, branching very irregular and lax, primary branches usually long and widely forking, tips of ultimate branches not recurved; asci 4–9, narrowly to broadly ovate, short-pedicellate, 42–56 × 24–32μ; spores 3–5, usually 4, 18–22 × 10–12μ.

On: *Oxalis corniculata, O. cymosa, O. stricta.*
Crete, Lincoln, Naponee, Valentine, Weeping Water.

MICROSPHAERA DIFFUSA Cook & Peck.

Microsphaera symphoricarpi Howe.

Amphigenous; mycelium persistent, thin and effused, sub-persistent, or in some cases evanescent; perithecia scattered or gregarious, globose-depressed, very variable in size, 55–126μ in diameter, averaging 90–100μ, cells 10–20μ wide; appendages very variable in number and length, 4–30, 1½–7 times the diameter of the perithecium, smooth, aspetate, or 1–3-septate in the lower half, colorless or pale brown toward the base, tip 3–5 times dichotomously divided, branching diffuse and irregular, branches of the higher orders sub-nodulose, tips of the ultimate branches not recurved; asci 4–9, 48–60 × 28–30μ, ovate-oblong with a very short pedicel; spores 3–6, usually 4, 18–22 × 9–11μ.

On: *Apios apios, Falcata comosa, Glycyrrhiza lepidota, Meibomia canescens, M. canadense, M. grandiflorum, Symphoricarpos occidentalis, S. symphoricarpos.*

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Burwell, Crete, Grand Island, Lincoln, Long Pine, Red Cloud, Roca, Scotia, Valentine, Wabash, Weeping Water.

MICROSPHAERA GROSSULARIAE (Wallr.) Lev.

Alphitromorpha grossulariae Wallr.
Erysiphe grossulariae (Lev.) De Bary.

Epiphyllous or amphigenous; mycelium evanescent, or subpersistent, thin and effused on the upper surface of the leaf; perithecia scattered or densely gregarious, globose-depressed, very variable in size, 60–130μ in diameter, cells 14–20μ wide; appendages 5–22, 1–1¾ times the diameter of the perithecium, colorless, aseptate, tip 4–5 times closely and regularly dichotomously branched, branches of the first and second orders very short, all of the segments deeply divided, ultimate branches forming a narrow fork, tips not recurved; asci 4–10, broadly ovate or oblong, usually with a very short pedicel, 46–62 × 28–38μ; spores 4–6, variable in size, 20–28 × 12–16μ.

On: *Sambucus canadensis.*

Crete, Fremont, Grand Island, Weeping Water.

While with us *M. grossulariae* is confined to the elder, *Sambucus canadensis,* in Europe it attacks the cultivated goose-berry, and sometimes becomes quite destructive. It has not been reported on Ribes from Nebraska as yet. Our common gooseberry mildew is *Sphaerotheca mors-uvae.*

ERYSIPHE Hedw.

Perithecia globose, or globose-flattened; asci several, 2–8-spored; appendages floccose, simple or obscurely branched, usually more or less similar to the mycelium and interwoven with it.

KEY TO THE SPECIES

I. Mature perithecia not containing spores on the living host.
  1. Perithecia large, 140–280μ, in diameter, more or less immersed in the lanuginose, persistent mycelium.... *E. graminis*
  2. Perithecia smaller, 80–140μ, not immersed in the mycelium.
    1) Haustoria lobed, asci 8-spored..... *E. galeopsidis*
    2) Haustoria not lobed, asci 2-spored..... *E. cichoracearum*

II. Mature perithecia containing spores on the living host.
  3. Appendages often interwoven with the mycelium, *E. polygoni*
  4. Appendages densely interwoven with the mycelium, haustoria not lobed ..... *E. cichoracearum*

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ERYSIPHE GRAMINIS DC.

Usually epiphyllous, sometimes amphigenous; mycelium subpersistent, effused or in scattered patches, at first white, later becoming gray or pale brown; perithecia large, 130–280μ in diameter, scattered or gregarious, somewhat depressed, sometimes becoming concave, usually immersed in the lanuginose, persistent mycelium; cells of the perithecium obscure; appendages poorly developed, few or many, very short, sparingly branched, brownish; asci numerous, 10–30, usually about 15, cylindric to ovate-oblong, more or less pedicellate, 70–100 × 25–40μ; spores 8, (sometimes 4) 20–25 × 10–13μ.

On: *Poa pratensis, Secale cereale, Triticum* sps.
Lincoln, Red Cloud, St. Paul, Wabash, Weeping Water.

ERYSIPHE GALEOPSIDIS DC.

On: *Stachys palustris, Scutellaaria lateriflora.*
Crete, Weeping Water.

This plant is sometimes described as a distinct species, but for the present I prefer to regard it as a mere form of *E. cichoraceaarum.* It is very much like *E. cichoracearum.* It is probable that *E. galeopsidis* contains only those forms of *E. cichoracearum* on the hosts named, and on which the spores in the perithecia do not mature on the living host.

ERYSIPHE CICHORACEARUM *DC.*

Erysiphe lamprocarpa Lev.
Erysiphe spadacea B. & C.

Amphigenous; mycelium usually evanescent or sometimes subpersistent and effused, white; perithecia sub-globose, or globose-depressed, often becoming concave, gregarious or scattered, 80–140μ in diameter, cells variable in size, usually very distinct, 10–20μ wide, sometimes smaller and obscure; appendages variable, long or short, brown or colorless, numerous, densely interwoven, branched, septate, light or brown throughout, two to four times the diameter of the perithecium; asci numerous, 10–15 or more, variable in size and shape, from narrowly ovate to broadly ovate, or rarely subglobose, more or less pedicellate, 60–90 × 30–50μ; spores 2, 20–28 × 12–20μ, usually about 24 × 14μ.

On: *Ambrosia artemisiaefolia, A. trifida, A. psilostachya, Aster ericoides, A. nebraskensis, A. laevis, A. multiflorus, A. paniculatus, Carduus altissimus, C. discolor, Bidens fron-*

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dosa, Boebera papposa, Eupatorium purpureum, E. ageratoides, Galium aparine, Grindelia squarrosa, Helianthus annuus, H. decapetalus, H. tuberosus, Heliopsis scabra, Helenium autumnale, Hydrophyllum virginicum, Iva xanthifolia, Lappula virginiana, Papaver rhoeas, Parietaria pennsylvanica, Phlox paniculata, Plantago major, P. rugelli, Rudbeckia laciniata, Solidago canadensis, S. mollis, S. rigida, Tragopogon porrifolius, Verbena bracteosa, V. hastata, V. stricta, V. urticifolia, Verbesina alternifolia, Vernonia fasiculata, Xanthium canadense.

Atkinson, Boelus, Callaway, Crete, Chadron, Elmwood, Florence, Fremont, Greeley, Hastings, Harrison, Lincoln, Long Pine, Loup City, Naponee, Riverton, Saltillo, Wabash, Weeping Water, Wood River, Warbonnet Canyon, Valentine, Red Cloud, Bloomington, St. Paul, Simeon, Burwell, Ainsworth, Calloway.

ERYSIPHE POLYGONI DC.

Erysiphe communis (Wallr.) Fr.

Amphigenous mycelium very variable, persistent, thin, effused, and arachnoid, or rarely thick, dense and lichenoid, often completely evanescent; perithecia gregarious to scattered, small, 65–180μ, usually about 90μ, cells usually distinct, 10–15μ wide; appendages very variable in number and length, sometimes few (3–7), distinct and long, or more rarely few and short, usually numerous and crowded, more or less densely interwoven, and long or short, always spreading horizontally, often interwoven with the mycelium, simple or branched, dark, or brown at the base or throughout, or almost colorless; asci usually few, 2–8, sometimes many, usually small and ovate, but varying from ovate to broadly ovate or globose, sessile or with a short pedicel, 46–72 $\times$ 30–45μ; spores 3–8, 19–25 $\times$ 9–14μ.

On: *Anogra pallida, Aquilegia vulgaris, Aster nebraskensis, Astragalus adsurgens, A. canadensis, A. sp., Brassica napus, Clematis virginiana, Falcata comosa, Lotus americanus, Muhlembeckia platyclados, Oenothera laciniata, Onagra biennis, Pisum sativum, Polygonum aviculare, P. ramosissimum, Ranunculus abortivus, R. cymbalaria, R. delphinifolius, Thalictrum purpurascens, Polygonum aviculare.*

Belmont, Central City, Chadron, Crawford, Crete, Hastings, Lincoln, Ord, Port Niobrara, Red Cloud, St. Paul, Valentine,

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Wabash, Weeping Water, Wood River, Grand Island, Orleans, Kennedy, Long Pine, Scotia.

This is our most variable species of the Erysiphaceae. It is most common and most variable with us on *Polygonum aviculare*. However it is also quite common on *Clematis virginiana*.

This paper constitutes the first publication in recent years dealing with a particular group of the local fungus flora with keys and specific descriptions. It must not be supposed for a moment that the above treatment contains the limit of our knowledge of the Erysiphaceae of Nebraska. It represents merely the sum of our present knowledge of the group, and in this way an attempt has been made to put the already known facts in regard to the group before the botanists and mycologists of the state. It is hoped that the paper may constitute the nucleus about which future and more systematic studies may be made, until sometime not far distant we may issue a fairly complete treatment of the Erysiphaceae of the state. I doubt not that there are other species of the group not mentioned here to be found in the state. Certainly the list of host plants will be considerably enlarged by future study. Probably not all of the present existing hosts for the various species have been listed here, but if not, it is because they have not been reported or placed in the Survey Herbarium or in the general fungus collection which contains all of the important exsiccati, and which have been studied during the preparation of the present treatise.

The enthusiastic and untiring work of Rev. J. M. Bates shows what the collector out in the state may do in extending the knowledge of the local flora. After many years' study of the seed plants of the state he undertook to learn something of the fungi. He has learned much during the years in which he has made extensive collections. Much of the information as to range and hosts of the various species in the above pages should be credited to him.

It is planned to publish as rapidly as possible progress reports on various groups of fungi for the state until the whole of the fungus flora shall have been studied. The writer solicits

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specimens of fungi of every sort. All such specimens will be carefully preserved and will be included in the proper publication when sufficient material is at hand to warrant its publication. So additional specimens and hosts of the Erysiphaceae, or corrections in the present paper will be gratefully received. All specimens of fungi should be accompanied in so far as possible by the name of the host, or with sufficient material that the host may be determined. For those fungi which do not have any particular host plant the general nature of the substratum should be indicated.

HOST INDEX.

ABBREVIATIONS: E.—Erysiphe, M.—Microsphaera, Ph.—Phyllactinia, P.—Podosphaera, S.—Sphaerotheca, U.—Uncinula.

Acer dasycarpum Ehrh. See Acer saccharinum L.
Acer saccharinum L. ..... U. circinata
Actinomeris squarrosa Nutt. See Verbesina alternifolia (L.) Britton.
Agrimonia hirsuta (Muhl.) Bichnell ..... S. humuli
Amelanchier botryapium (L. f.) DC. ..... P. oxyacanthae
Ambrosia artemisiaefolia L. ..... E. cichoracearum
Ambrosia psilostachya DC. ..... E. cichoracearum
Ambrosia trifida L. ..... E. cichoracearum
Ampelopsis quinquefolia Michx. See Parthenocissus quinquefolia (L.) Planch.
Amygadalus persica L. ..... S. pannosa
Anogra pallida (Lindl.) Britton ..... E. polygoni
Apios apios (L.) MacM. ..... M. diffusa
Aquilegia vulgaris L. ..... E. polygoni
Aralia nudicaulis L. ..... Ph. corylea.
Aster ericoides L. ..... E. cichoracearum
Aster multiflorus Burgess ..... E. cichoracearum
Aster laevis L. ..... E. cichoracearum
Aster nebraskensis Britton ..... E. polygoni
Aster nebraskensis Britton ..... E. cichoracearum
Aster paniculatus Lam. ..... E. cichoracearum
Astragalus adsurgens Pall. ..... E. polygoni
Astragalus canadensis L. See Astragalus carolinianus L.
Astragalus carolinianus L. ..... E. polygoni
Astragalus sp. ..... E. polygoni
Bidens cernua L. ..... S. pannosa.
Bidens frondosa L. ..... S. humuli
Bidens laevis (L.) B.S.P. ..... S. humuli
Boebera papposa (Vent.) Rydb. ..... E. cichoracearum

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Brassica napus L. ..... E. polygoni
Carduus discolor (Muhl.) Nutt. ..... E. cichoracearum
Catalpa catalpa (L.) Karst. ..... M. alni vaccinii
Catalpa speciosa Warder ..... M. alni vaccinii
Celastrus scandens L. ..... Ph. corylea.
Clematis virginiana L. ..... E. polygoni
Cnicus altissimus Willd. See Carduus altissimus L.
Collomia linearis Nutt. See Gilia linearis (Nutt.) Gray.
Cornus stolonifera Michx. ..... Ph. corylea.
Desmodium canadense DC. See Meibomia canadensis (L.) Kuntze.
Desmodium canescens L. See Meibomia canescens (L.) Kuntze.
Desmodium grandiflorum (Walt.) DC. See Meibomia grandiflorum (Walt.) Kuntze.
Dysodia papposa (Vent.) Hitc. See Boebera papposa (Vent.) Rydb.
Eupatorium ageratoides L. ..... E. cichoracearum
Eupatorium purpurem L. ..... E. cichoracearum
Euphorbia marginata Pursh. ..... E. euphorbiae
Falcata comosa (L.). Kuntze ..... E. polygoni
Falcata comosa (L.) Kuntze ..... M. diffusa
Fraxinus lanceolata Berk. ..... Ph. corylea.
Fraxinus viridis Michx. See Fraxinus lanceolata Berk.
Galium aparine L. ..... E. cichoracearum
Geum album J. F. Gmel. See Geum canadense Jacq.
Geum canadense Jacq. ..... S. humuli
Gilia linearis (Nutt.) Gray ..... S. humuli
Glycyrrhiza lepidota Pursh. ..... M. diffusa
Grindelia squarrosa (Pursh.) Dunal ..... E. cichoracearum
Helianthus annuus L. ..... E. cichoracearum
Helenium autumnale L. ..... E. cichoracearum
Helianthus decapetalus L. ..... E. cichoracearum
Helianthus tuberosus L. ..... E. cichoracearum
Heliopsis scabra Dunal ..... E. cichoracearum
Hydrophyllum virginicum L. ..... E. cichoracearum
Iva xanthifolia (Fresen.) Nutt. ..... E. cichoracearum
Lotus americanus (Nutt.) Bisch. ..... E. polygoni
Lappula virginiana (L.) Greene ..... E. cichoracearum
Lathyrus odoratus L. ..... M. alni
Lonicera glaucescens Rydb. ..... M. alni
Malus malus (L.) Britton ..... P. leucotricha
Meibomia canadensis (L.) Kuntze ..... M. diffusa
Meibomia canescens (L.) Kuntze ..... M. diffusa
Meibomia grandiflorum (Walt.) Kuntze ..... M. diffusa
Muhlenbeckia platyclados Meissn. ..... E. polygoni
Oenothera biennis L. See Onagra biennis (L.) Scop.

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Oenothera laciniata Hill..... E. polygoni
Onagra biennis (L.). Scop..... E. polygoni
Ostrya virginiana (Mill.) Willd..... Ph. corylea.
Oxalis corniculata L..... M. russellii
Oxalis cymosa Small..... M. russellii
Oxalis stricta L..... M. russellii
Papaver rhoeas L..... E. cichoracearum
Parietaria pennsylvanica Muhl..... E. cichoracearum
Parthenocissus quinquefolia (L.) Planch..... U. necator
Phlox paniculata L..... E. cichoracearum
Pisum sativum L..... E. cichoracearum
Plantago major L..... E. cichoracearum
Plantago rugelii Dec..... E. cichoracearum
Poa pratensis L..... E. graminis
Polygonum aviculare L..... E. polygoni
Polygonum ramosissimum Michx..... E. polygoni
Populus deltoides Marsh ..... U. salicis
Populus monilifera Ait. See Populus deltoides Marsh.
Prunus americana Marsh..... P. oxyacanthae
Prunus americana Marsh..... P. tridactyla
Prunus besseyi Bailey..... P. oxyacanthae
Prunus cerasus L..... P. oxyacanthae
Prunus cerasus L..... P. tridactyla
Prunus demissa (Nutt.) Walp..... P. oxyacanthae
Prunus serotina Ehrh..... P. oxyacanthae
Prunus virginiana L..... P. oxyacanthae
Pyrus malus L. See Malus malus (L.) Britton.
Quercus macrocarpa Michx..... M. alni
Quercus rubra L..... M. alni
Ranunculus abortivus L..... E. polygoni
Ranunculus cymbalaria Pursh..... E. polygoni
Ranunculus delphinifolius Torr..... E. polygoni
Ranunculus multifidus Pursh. See Ranunculus delphinifolius Torr.
Rhus glabra L..... S. humuli
Ribes aureum Pursh..... S. mors-uvae
Ribes floridum L'Her..... S. mors-uvae
Ribes grossulariae L..... S. mors-uvae
Ribes rotundifolium Michx..... S. mors-uvae
Rosa arkansana Porter..... S. pannosa.
Rosa multiflora Thunb..... S. pannosa.
Rudbeckia laciniata L..... E. cichoracearum
Salix amygdaloides Anders..... U. salicis
Salix cordata Muhl..... U. salicis
Salis fluviatalis Nutt..... U. salicis

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Salix humilis Marsh..... U. salicis
Salix nigra Marsh..... U. salicis
Salix sp..... U. salicis
Sambucus canadensis L..... M. grossulariae
Scutellaria lateriflora L..... E. galeopsidis
Secale cereale L..... E. graminis
Senecio fremontii (T. & G.) Rydb..... S. humuli
Solidago canadensis L..... E. cichoracearum
Solidago mollis Bartl..... E. cichoracearum
Solidago rigida L..... E. cichoracearum
Stachys palustris L..... E. galeopsidis
Symphoricarpos symphoricarpus (L.) MacM..... M. diffusa
Symphoricarpos vulgaris Michx. See Symphoricarpos symphoricarpos (L.) Macm.
Symphoricarpos occidentalis Hook..... M. diffusa
Syringa chinensis Willd..... M. alni
Syringa vulgaris L..... M. alni
Taraxacum taraxacum (L.) Karst..... S. pannosa.
Taraxacum taraxacum (L.) Karst..... S. humuli
Thalictrum purpurascens L..... E. polygoni
Tragapogon porrifolius L..... E. cichoracearum
Triticum sp..... E. graminis
Ulmus americana L..... U. macrospora
Verbena bracteosa Michx..... E. cichoracearum
Verbena hastata L..... E. cichoracearum
Verbena stricta Vent..... E. cichoracearum
Verbena urticifolia L..... E. cichoracearum
Verbesina alternifolia (L.) Britton..... E. cichoracearum
Vernonia fasciculata Michx..... E. cichoracearum
Vitis cordifolia Michx..... U. necator
Vitis riparia Michx..... U. necator
Vitis vulpina L. See Vitis riparia Michx.
Vitis sp..... U. necator
Xanthium canadense Mill..... E. cichoracearum
Xanthoxylum americanum Mill..... E. cichoracearum
Zanthoxylum americanum L. See Xanthoxylum americanum Mill.

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Synonyms are in italics.

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The above is by no means a complete bibliography of the Erysiphaceae. These few references are given as an aid to the student in working out something more of the details in regard to this particular group of fungi. For a more complete list of the literature on the group see the above articles, especially Salmon's monograph and Harper's Carnegie publication.

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EXPLANATION OF PLATES.

PLATE I. The round of life in the Erysiphaceae.

Fig. 1. Germination of an ascospore.
Fig. 2. Portion of mycelium with conidiophore and chain of conidiospores.
Fig. 3. Germination of a conidiospore.
Fig. 4. Tips of two hyphae with cross walls.
Fig. 5. Later stages of same with oögone and antherid well begun.
Fig. 6. Oögone and antherid fully developed.
Fig. 7. Conjugation.
Fig. 8. Carpogone with first layer of cover cells.
Fig. 9. Carpogone with two layers of cover cells.
Fig. 10. Elongation and division of carpogone.
Fig. 11. Perithecium with outer and inner walls, rudimentary appendages, ascus and ascospores.
Fig. 12. A single ascus with ascospores.

Figures 6–10 are modified after Harper and others.

PLATE II. General structure.

Fig. 13. Perithecium of *Microsphaera* with appendages.
Fig. 14. Perithecium of *Uncinula* with appendages.
Fig. 15. Tip of an appendage from *Microsphaera grossulariae*.
Figs. 16 and 17. Haustoria.
Fig. 18. Perithecium of *Podosphaera* with appendages.
Figs. 19, 20 and 21. Variations in the tip of the appendage of *Uncinula*.
Fig. 22. Perithecium of *Erysiphe* or *Sphaerotheca* with appendages.
Fig. 23. Perithecium of *Phyllactinia* with appendages.

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PLATE I

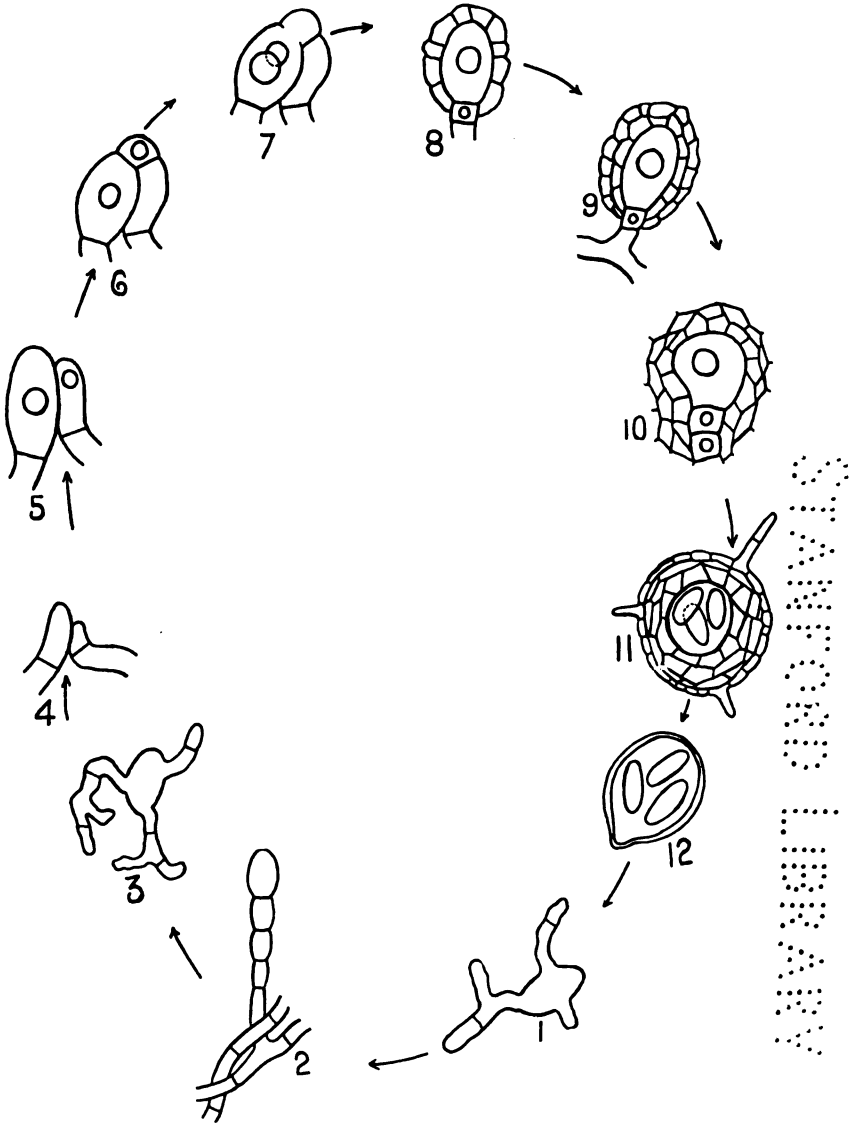

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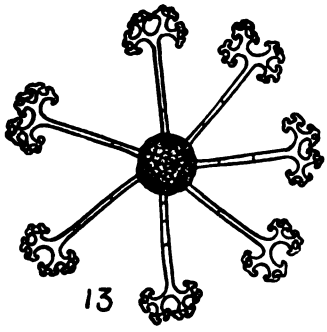
PLATE 2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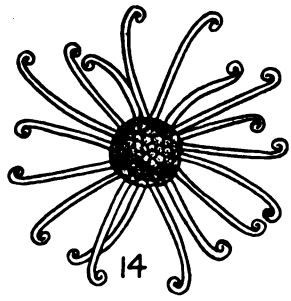
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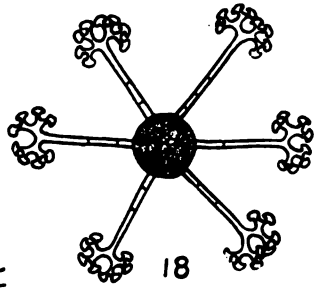
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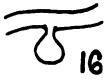
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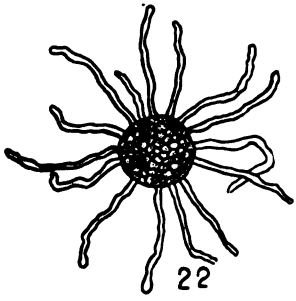
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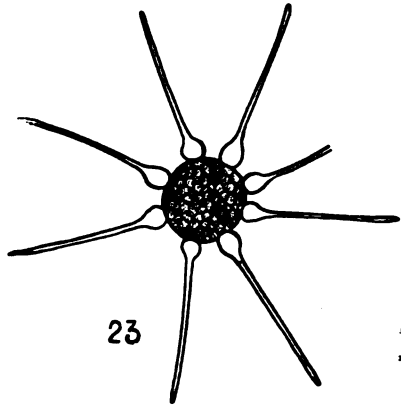
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UNIVERSITY STUDIES

VOL. X *APRIL 1910* No. 2

THE APHIDIDAE OF NEBRASKA

BY THOMAS ALBERT WILLIAMS

The present paper is being published posthumously, having been presented to the University of Nebraska in 1891 by Mr. Williams as a thesis to fulfil part of the requirements of a minor in entomology for the degree of master of arts, and remaining still unpublished at the time of his death, which occurred December 23, 1900. It was expected at the time of presentation that the thesis would be published at an early date and, while engaged in completing it, Mr. Williams prepared as *Special Bulletin* No. 1 of the Department of Entomology, University of Nebraska, a preliminary "Host-Plant List of North American Aphididae," in which he included not only a complete summary of the previously recorded food plants of our aphid fauna but also all of his original personal observations, which course necessitated the use of his manuscript names of new species. This list was published July 8, 1891. While such publication would hardly be expected to establish priority, these names are somewhat different from the ordinary *nomina nuda* in the fact that they referred to insects found feeding upon definite and frequently characteristic host-plants, and moreover the complete specific descriptions were at the time all prepared and reposing in manuscript form in the archives of the University of Nebraska. The recent intensive study of the Aphididae which is being carried on by several specialists in this country has made it very desirable that Mr. Williams' names be substantiated by the publication of his de-

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scriptions, and these are herewith presented exactly as he left them.

In explanation of Mr. Williams' taxonomic methods it is necessary to state that when he collected a number of aphids he mounted them upon as many slides as it took to do so properly and drew up his descriptions from these slides collectively, so that each slide became in fact a cotype except in a few cases where all the specimens were mounted upon a single slide and consequently that slide became his type. Sometimes he marked his slides of cotypes "types" and sometimes he omitted doing so. Sometimes there are two or three slides of the same new species all marked "type." Mr. Williams deposited nearly complete sets of his material both in the collections of the University of Nebraska and in the United States National Museum, and the numbers referred to in designating type slides are those of these two series which are numbered independently and in a different sequence.

In the "Host-Plant List" the following names were referred to as representing new species: *Pemphigus alnifoliae, oenotherae, walshii; Lachnus flocculosa, rileyi, smilacis; Callipterus ulmifolii; Chaitophorus bruneri, cordatae, salicis; Aphis artemisicola, canae, chrysanthemicola, cnici, lilicola, lonicericola, lugentis, partheno-cissi, saniculae, sativae, senecionis, solidaginifoliae, yuccicola; Myzus oenotherae, potentillae, thalictri; Rhopalosiphum dianthi poae; Siphonophora artemisicola, carnosa impatientis, chrysan-themicolens, desmodii, eupatorii, gaurae, garrina, grindeliae, lu-teola; Phorodon cyanoglossi, monardae; Cryptosiphum canaden-sis.* In addition to these forms mentioned in the "Host-Plant List," Mr. Williams discovered and described two other species, *Pemphigus balsamiferae* and *Aphis pentstemonis* and specimens of these species are in both collections. Of the species included in the "Host-Plant List" one, *Callipterus ulmifolii,* had previously been described by Monell and was so regarded by Williams in his thesis, its appearance in the "Host-Plant List" as a new species being probably a *lapsus pennae.* The "Host-Plant List" mentions *Chaitophorus salicis* and *Pemphigus oenotherae* as new

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TYPES AND COTYPES OF T. A. WILLIAMS' SPECIES IN THE COLLECTIONS OF THE UNIVERSITY OF NEBRASKA AND OF THE U. S. NATIONAL MUSEUM

Species	Type or cotype		Exact date on label	Whether labeled as type or cotype
Pemphigus alnifoliae	Cotype	Neb. no. 4 U. S. no. 120	6/21/90	labeled only "n. sp."
Pemphigus balsamiferae	Cotype	Neb. no. 5 U. S. no. 121	6/24/90	labeled only "n. sp."
Lachnus ponderosae	Cotype	Neb. no. 24 U. S. no. 78	6/20/90	labeled only "n. sp."
Lachnus rileyi	Type	U. S. no. 79		
Lachnus smilacis	Type	U. S. no. 77		
Chaitophorus bruneri	Cotype	Neb. no. 25 U. S. no. 38	6/21/90	labeled only "n. sp."
Chaitophorus cordatae	Type	U. S. no. 39	6/24/90	
Aphis artemisicola	Cotype	Neb. no. 53 U. S. no. 56	6/24/90	labeled "n. sp."—"type"
Aphis canae	Cotype	Neb. no. 54 U. S. no. 60	6/24/90	labeled "n. sp."—"type"
Aphis chrysanthemicola	Cotype	Neb. no. 55, 56	12/30/90	labeled only "n. sp."
Aphis cnici	Cotype	Neb. no. 57 U. S. no. 64	6/22/90	labeled "n. sp."—"type"
Aphis lilicola	Cotype	Neb. no. 67, 68 U.S. no. 85	1/12/91	labeled "n. sp."—"type"
Aphis longicericola	Cotype	Neb. no. 70 U. S. no. 87	5/14/90	labeled only "n. sp."
Aphis lugentis	Cotype	Neb. no. 71 U. S. no. 91	6/23/90	labeled "n. sp."—"type"

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Species	Type or cotype		Exact date on label	Whether labeled as type or cotype
Aphis parthenocissi	Cotype	Neb. no. 81, 82 U. S. no. 101	8/7/90	labeled only "n. sp."
Aphis pentstemonis	Cotype	Neb. no. 83, 84 U. S. no. 102	6/23/90	labeled only "n. sp."
Aphis saniculae	Cotype	Neb. no. 86 U. S. no. 109	6/21/90	labeled "n. sp."—"type"
Aphis sativae	Cotype	Neb. no. 87 U. S. 108	10/10/88	labeled "n. sp."—"type"
Aphis senecionis	Cotype	Neb. no. 88 U. S. 110	6/20/90	labeled only "n. sp."
Aphis solidaginifoliae	Cotype	Neb. no. 91, 92 U. S. no. 111	9/20/90	labeled only "n. sp."
Aphis yuccicola	Cotype	Neb. no. 97, 98, 99 U. S. no. 319	6/18/90	labeled "n. sp."—"type"
Myzus oenotherae	Cotype	Neb. no. 103, 104 U. S. no. 134, 397	5/30/90	labeled only "n. sp."
Myzus potentillae	Cotype	Neb. 107, 108 U. S. no. 376	5/24/90	labeled only "n. sp."
Myzus thalictri	Cotype	Neb. no. 111, 112 U. S. no. 139, 140	6/21/90	labeled only "n. sp."
Rhopalosiphum dianthi var. poae	Cotype	Neb. no. 119 U. S. no. 26	2/1/90	labeled only "n. var."
Siphonophora artemisicola	Cotype	Neb. no. 126 U. S. no. 4	6/24/90	labeled only "n. sp."
Siphonophora chrysanthemicolens	Cotypes	Neb. no. 131, 132 U. S. no. 7, 149		labeled only "n. sp."

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Species	Type or cotype		Exact date on label	Whether labeled as type or cotype
Siphonophora carnosa var. impatientis	Cotype	Neb. no. 127, 128, 129 U. S. no. 18	8/22/90	labeled only "n. var."
Siphonophora desmodii	Cotype	Neb. no. 133, 134, 135 U. S. no. 10, 11	7/29/90	labeled only "n. sp."
Siphonophora gaurae	Cotype	Neb. no. 140	9/4/90	labeled only "n. sp."
Siphonophora gaurina	Cotype	Neb. no. 141 U. S. no. 17, 397	9/0/90	labeled only "n. sp."
Siphonophora grindeliae	Cotype	Neb. no. 142 U. S. no. 396	5/8/89	labeled only "n. sp."
Siphonophora luteola	Type	U. S. no. 398		
Phorodon cynoglossi	Cotype	Neb. no. 157, 158, 159 U. S. 141, 142	1/5/91	labeled only "n. sp."
Phorodon monardae	Type	Neb. no. 160	5/24/90	labeled "n. sp."—"type"
Chryptosiphum canadensis	Cotype	Neb. no. 161, 162 U. S. no. 36, 37, 148	7/31/90	labeled only "n. sp."

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species, but these are not among the descriptions left by Williams in the thesis nor are there slides of the same, and consequently they will probably have to continue as *nomina nuda*. *Phorodon monardae* also is not included in the thesis but Williams has left a slide in the University of Nebraska Collection (no. 160) labeled "n. sp.," "type," from which a description can probably later be drawn. The remaining species mentioned in the "Host-Plant List" are represented by both descriptions and specimens except in the case of *Pemphigus walshii, Lachnus flocculosa* and *Siphonophora cupatorii,* of which species there are no specimens in the collection but of which there are full descriptions.

Family **APHIDIDAE**

Subfamily **CHERMESINAE**

Genus **Phylloxera**

1. **Phylloxera caryae-caulis** (Fitch).

Fitch, Ins. N. Y., I and II, p. 155 (1854). (*Pemphigus caryae-caulis.*)
Shimer, Trans. Am. Ent. Soc., II, p. 389, ibid., p. 391 (1869). (*Dactylosphaera subellipticum* and *D. caryae-magnum.*)
Riley, Ins. Mo., 7th Rep., p. 117 (1875). (*Phylloxera caryae-caulis.*)
Thomas, Ins. Ill., 8th Rep., p. 160 (1879).

Apterous oviparous female: Body distended with eggs. Broadly pear-shaped, rapidly narrowed behind. General color dirty white to yellowish green. Antennae brown; 3-jointed; III about two thirds the whole antennae; 0.40 mm. long. Beak brownish, 0.45 mm. long. Legs short, brown. Coxae brown. Body about 1.95 mm. long and 1.50 mm. wide.

The very young are uniformly whitish, becoming greenish yellow with age. The pupae are light yellowish green, with the head and thorax often slightly dusky. Eyes red. Antennae and legs dusky. About 1.00 mm. in length.

Winged form: General color light yellowish green; head and thorax brown to black. Eyes bright red. Antennae brownish, 0.25 mm. long; III about 0.16 mm. long, with a large tooth-like projection near the base, then becoming narrow and the end club-shaped. Legs dusky. Abdomen drawn out behind with a gradually narrowed outline. Beak about the length of the antennae, dusky especially toward the tip. Wings hyaline; stigma with both ends pointed, having the appearance of a thickened portion of the wing, opaque. Oblique veins dusky, robust, well defined throughout. Length of body 1.20–1.50 mm., to tip of wings 1.50–2.25 mm.

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depending on the age of the insect, being much greater when the abdomen is full of eggs.

On hickory (*Carya amara*), Wabash, June 1, 1889, when only the foundress of the colony and the very young larvae were found. On *C. porcina,* Ashland, May 24 and June 11, 1890. On the latter date plenty of winged forms were found in the galls which were breaking open at the apex to allow the lice to escape. The galls are rather large, more or less elongated masses on the young twigs, petioles, and the base of the midveins of the leaves. In some cases they assume a somewhat conical outline. The younger trees and shoots are most affected, often nearly the entire foliage being distorted by the galls.

Specimens in collection of the University of Nebraska (nos. 1, 2) and of the U. S. National Museum (no. 159).

2. **Phylloxera vastatrix** Planch.

On *Vitis cordifolia,* Fremont, July 31, 1890, specimen no. 3, University of Nebraska collection.

Genus **Pemphigus**

3. **Pemphigus alnifoliae** n. sp.

The young are light yellowish green, legs and antennae whitish. Pupae similarly colored.

Winged female: Head and thorax black. Head rather small. Antennae brownish black with white rings at each joint and sometimes V and VI are quite pale colored, III equals IV and V, IV, V and VI subequal, VI with its spur about two thirds III; IV, V and VI club-shaped, III cylindrical. Antennae on quite prominent, pale tubercles. Eyes black. Wings with yellow insertions and yellowish stigma, first and second discoidals starting from nearly the same place, slightly curved. Cubital moderately distinct for its whole length, starting from nearly the same place as the second discoidal. All of the discoidals as well as the stigmal vein with smoky borders. Abdomen light yellowish green. Legs dusky. Length of antennae 0.10 mm., length of body 3.54 mm.

Stem-mother: Dark green; head, antennae and some markings on thorax dusky. Abdomen swollen, ovate or oblong. Length of body 3.75 to 4.00 mm. All forms more or less covered with white flocculency.

On leaves of *Amelanchier alnifolia,* causing them to curl and form a pseudogall. War Bonnet Canyon, June 21, 1890.

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Cotypes in collection of the University of Nebraska (no. 4) and of the U. S. National Museum (no. 120).

4. **Pemphigus balsamiferae** n. sp.

Stem-mother: General color pale green; head, antennae and legs dusky black. Antennae 4-jointed, joint III longest, IV with very short claw. Abdomen swollen, broadly oval, generally pointed posteriorly, with six longitudinal rows of white spots (white flocculent when fresh) above, and a marginal row of small brownish spots.

Larva pale green. Pupa pale green with paler thorax, wing-pads, legs, and antennae; legs and antennae become darker with age.

Winged female: Head, legs, antennae and thorax brown to black; neck and abdomen green; joints I and II subequal, IV, V and VI club-shaped, III with 8–10 narrowly elongate transverse sensoria, IV with 3–4, V with 3, VI with none. Joints III–VI more or less annulate. Wings with heavy black costal and subcostal veins, first and second discoidals only moderately near at the base, third discoidal obsolete for about one third its length. Stigma dusky acute at inner end, outer end angled, stigmal vein curved slightly.

Squaw Creek, June 24, 1890. On *Populus balsamifera,* forming an irregular semiglobular or more or less elongated gall on the under side of the leaves, with an irregular opening on the upper side.

Cotypes in collection of the University of Nebraska (no. 5) and of the U. S. National Museum (no. 121).

5. **Pemphigus fraxinifolii** Riley.

Riley, Bull. U. S. Geol. Sur. Ter., Vol. VI, p. 17 (1879).
Thomas, Ins. Ill., 8th Rep., pp. 146, 210 (1879).
Oestlund, Syn. Aph. Minn., p. 23 (1887).

Winged female: Alar expanse 5.70 mm. Head and thorax dusky; abdomen dark green. Antennae reaching by the length of the apical joint beyond the costal base of front wings; inconspicuously annulated and with joints III to VI but moderately narrowed at base; III as long as IV and V together; VI (including unguis) nearly three fourths as long as V, with the unguis distinct and of normal length. Scutellar lobes of mesonotum broad and well marked. Legs normal. Wings hyaline; stigma linear, or not wider than subcostal space, yellowish and poorly defined anteriorly; veins very slender and subhyaline, the stigmal most distinct, starting a little in front of middle of stigma and but faintly curved; cubital almost invisible but not obsolete at base, where it nearly joins the

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second discoidal. Terminal space between the first and second discoidals and between the last and cubital subequal; that between cubital and stigmal only half as great. Discoidals of hind wings proceeding connectedly from subcostal. Promiscus reaching beyond front coxae; abdomen with 7 rather large round spots on each side, each sending out 2 hairs. (In some specimens the cubital starts independently from the subcostal; in others it joins the second discoidal a short distance from the base.) Pupa with third joint of antennae relatively somewhat shorter.

Larva of probable second generation: Antennae smooth, 4-jointed; III longer than IV and as long as I and II together; apical nipple one sixth as long as IV. Promiscus slender, reaching beyond hind coxae. Legs rather long and stout. Tibiae, tarsi and anal joints of abdomen with a few conspicuous hairs. Full grown apterous female, probably of same generation, differs in having 6-jointed antennae, proportioned much as in the winged female.

Larva from winged female (probably fourth generation): Antennae 5-jointed; I, II, III and IV subequal in length; III and IV stouter; V very short and rounded at tip. Promiscus very long, reaching beyond tip of abdomen.

Infesting the terminal leaves of ash (*Fraxinus americana* and *S. sambucifolia*) from spring till late summer, and producing a twisted curl thereof; the young lice varying in color from deep glaucous to livid, very flocculent and exuding the liquid globules quite copiously; winged females appearing early in June (Riley).

On ash (*Fraxinus americana*). Ashland, May 25, 1890. Lincoln, June 4, 1890, when the first winged females were found.

Specimens in collection of the University of Nebraska (nos. 6, 7) and of the U. S. National Museum (nos. 122, 123, 339).

6. **Pemphigus populicaulis** Fitch.

Fitch, Ins. N. Y., V, p. 845, par. 353 (1859).

Walsh, Proc. Ent. Soc. Phil., I, p. 305 (1862). *Byrsocrypta (pemphigus) populicaulis.*

Thomas, Ins. Ill., 8th Rep., p. 149 (1879). *Pemphigus populicaulis.*

LeBaron, Ins. Ill., 3d Rep., p. 193 (1873).

Oestlund, Syn. Aph. Minn., p. 21 (1887).

Stem-mother: Subglobose, pale yellowish. Antennae 4-jointed, brownish. Legs and coxae brown. Beak short, pale, brown tipped. Eyes imperfect, blackish.

Pupa pale yellowish. Eyes red. Legs, antennae and wing-pads whitish. Antennae 6-jointed, III longest.

Winged viviparous female: Head and thorax black. Eyes dark red.

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Antennae reaching to rear of thorax, I and II pale, rest dusky; III equaling IV and V together and rather longer than VI with its unguis, cylindrical; IV–VI club-shaped, III–VI irregularly and indistinctly annulate; VI with the contraction to the unguis abrupt. Wings delicate, the three discoidals arising almost from the same place, the third subobsolete at base. The apices of the first and second twice as far apart as those of the second and third. Stigma rather broad. Legs dusky. Abdomen yellowish green, pulverulent, the embryos showing very plainly. Length of body 2.15 mm., to tip of wings 3.25 mm.; alar expanse about 6.00 mm.

On cottonwood. Lincoln, Weeping Water, Ashland, Squaw Creek. One of our commonest aphids. It forms a gall at the base of the leaves by causing the petiole to become twisted. The winged insects escape through an oblique opening in the gall where the edges of the twisted petiole come together. Winged females are found in June.

Specimens in collection of the U. S. National Museum (no. 124).

7. **Pemphigus populi-monilis** Riley.

Riley, Bull. U. S. Geol. Sur. Ter., Vol. V, I, p. 13, pl. II, fig. 3 (1879).
Thomas, Ins. Ill., 8th Rep., p. 205, fig. 45 (1879).

Winged female: Average expanse 6.50 mm. Black, the abdomen a little lighter, especially at the tip, finely powdered with white; broad across the shoulders, the scutellar lobes of the mesonotum being rather more flattened than the praescutum; the head rather small and narrow. Antennae and legs rather short, the former reaching only to base of front wings; 6-jointed, I, II, IV and V subequal in length; III twice as long; VI not quite as long as III; I and II very stout; III, IV and V somewhat clavate, nearly smooth above, but with about 12 deep constrictions beneath. Legs normal, with basal joints of tarsus tolerably well separated and unguis stout. Wings subhyaline, front wings with stigma strongly angulate, dusky, the lower portion almost black. Veins dusky, the costal and subcostal stout and darkest. The stigmal vein undulate, starting from a little beyond the middle of the stigma. First and second discoidals almost connected at base (in three specimens entirely so) and the distance between them about one third greater than that between the second and third discoidals, and that between these two subequal with that between the last mentioned and stigmal; third discoidal obsolete at base, fold of hind border but moderately thick. Hind wings ample, hook-angle but moderate, the subcostal slightly undulate and considerably elbowed at basal third, whence spring the discoidals, the first bending slightly toward posterior margin, the second toward costal margin, the spaces between the tips of

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the costal and discoidals subequal and together rather more than half the posterior border. (An examination of fourteen specimens only showed one with third discoidal forked in both wings and another with the same vein forked on the left wing and second discoidal also forked near the tip.) When newly hatched in the first stage the basal joint of the tarsus is hardly perceptible and the tarsal hairs are simple. The antennae are 4-jointed, the basal joint half as long as the second, third and fourth, somewhat longer and subequal; fourth suddenly narrowed at tip; the promiscus reaches beyond the hind coxae. After the first molt the antennae are 5-jointed, IV very short and almost globular; the promiscus now reaches to middle coxae only. In the pupa stage the antennae are 6-jointed.

Young from winged female similar to the same stage of its parent, except in the promiscus reaching beyond anus. Length 0.15 mm.

Galls on the narrow-leaved cottonwood (*Populus angustifolia*). A series of more or less confluent moniliform swellings on the upper side of the leaf, each containing a single female, destined to become winged, when it escapes from beneath, the winged insect occupying the entire cavity of the gall. The galls are often so plentiful as to cover nearly every leaf of the tree, but other kinds, as *P. monilifera*, *P. tremuloides*, etc., are not injured, being entirely free from the galls of this louse. The galls when not very numerous appear most commonly on the terminal leaves of a twig. They form a confluent series of pale yellow ovoid swellings, on each side of the midrib, recalling in the distance a lot of unripe cherries, or, again, the galls produced on a true willow by the sawfly larva, *Nematus salicis-pomum* Walsh. There are sometimes three rows of these swellings, and they are not infrequently tinted red. There are, however, more often but two rows, occupying nearly the whole space each side of the midrib. The galls are formed by the folding under of the sides of the leaf and bulging of the same around the insect, which is always found solitary (Riley).

On narrow-leaved cottonwood (*Populus angustifolia*). Squaw Canyon, Sioux Co., June 24, 1890. Only the youngest leaves were affected, and only young, wingless lice were found. Professor Bruner found it quite plentiful in Idaho and Utah in the month of August; Colorado, July (Riley); Kansas (Monell).

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Specimens in collection of the University of Nebraska (no. 8) and of the U. S. National Museum (no. 125).

8. Pemphigus populi-transversus Riley.

Riley, Bull. U. S. Geol. Sur. Ter., Vol. V, I, p. 15, pl. fig. 5 (1879).
Thomas, Ins. Ill., 8th Rep., p. 208, fig. 47 (1879).
Oestlund, Syn. Aph. Minn., p. 21 (1887).

Winged female: Expanse 7 mm., pruinescent, with abdomen more yellowish, inclining to green. Antennae reaching a little beyond the base of front wings, smooth; III, IV and V cylindrical and of equal thickness; III as long as the other two together; VI more slender at base and with the apical unguis nearly as long as III. Thorax with mesonotal swellings small. Terminal distance between first and second discoidal veins nearly equal to that between this last and the stigmal vein; discoidals almost connected, cubital obsolete at base, subcostal heavy. Stigma scarcely wider than subcostal space, acuminate at tip and with the vein starting a little in front of its middle. Hind wings with the discoidals connected at base, where the subcostal is slightly produced. Legs normal. Abdomen showing about 30 pseudova and with 4 rows of faint piliferous dots on the dorsum.

Pupa with I, II, IV and V of antennae subequal in length. The wingless forms are pale creamy white, with faintly dusky members.

Gall formed upon the leaf of *Populus balsamifera.* An elongate oval swelling, causing the curving and broadening of the petiole, and opening on the opposite side by a transverse slit, with a whitish, slightly thickened and elevated margin, recalling human lips. By the latter part of June the stem-mother is surrounded with young of various sizes, all covered with the usual white secretion, and mixed with the liquid globules. Winged females produced in autumn, sometimes not till the leaves have fallen (Riley).

On cotton wood (*Populus monilifera*). Lincoln, October 13, 1888, when winged females were found; Weeping Water, during the summer and fall, 1888 to 1890; Ashland, June 20 and September 25, at which latter date winged females were found in the galls, evidently but lately transformed.

Specimens in collection of the U. S. National Museum (nos. 126, 128).

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9. **Pemphigus rhois** Fitch.

On *Rhus glabra,* West Point, July 29, 1890, specimen no. 9, University of Nebraska collection.

10. **Pemphigus tesselata** (Fitch).

Fitch, 4th Rep. St. Cab. Nat. Hist. (1851). *Eriosoma tesselata.*
Glover, U. S. Ag. Rep., p. 39 (1876).
Glover, Unpub. Pl. Hom., III, fig. 10, *imbricata.*
Thomas, Ins. Ill., 8th Rep., p. 139 (1879). *Schizoneura tesselata.*
Osborn, Can. Ent., XIV, p. 61 (1882). *Pemphigus tesselata.*

Apterous viviparous female: General color bluish black. Antennae 5-jointed, III longest, blackish brown, with whitish ring at the articulations, with a few very fine hairs, 0.80 mm. long. Head brownish, a broad blackish brown band extending along each side just at the base of the antennae and the eyes, which turns in at right angles and runs transversely across the base of the head, where it is divided by a narrow whitish line on each side of which is a small circular dot; pulverulent but not flocculent. Eyes small, black. Beak reaching to hind coxae. Legs short. Abdomen with segments distinctly separated, and with longitudinal striae forming square checker-like places on the dorsum. In each of these squares is a circular, pore-like spot from which proceed long shreds of flocculent matter, which cover the abdomen and extend out beyond the tip. Apex of abdomen hairy. Length of body 4 mm.

On the under side of the leaves of ash (*Fraxinus americanus*), causing the leaves to curl and become distorted. Ashland, May 15, 1890.

I was obliged to leave the vicinity before the winged form appeared, so did not procure any of them. The following description is taken from Professor Osborn's paper on this species in Can. Ent., XIV, p. 62: "Fresh specimens of winged females cleaned in alcohol are described in Ms. by Dr. Hagen as 'Head and antennae black, prothorax pale dirty whitish; thorax chestnut brown; abdomen pale whitish gray, above with six rows of blackish spots; beneath with four blackish fine lines near the middle, not reaching the tip; legs brown, tibiae and tarsi paler; wings opaque, veins pale, except the mediana of the fore wings, which is brown. Full grown nympha is similar to the imago; the wing coverings are black.'

"'Alcoholic specimens of winged viviparous female were dark bluish black with the white filaments on the abdomen less promi-

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nent than in the apterous female; head and thorax covered with whitish powder. The antennae are 6-jointed by the division of the third(?) larval joint into *three,* the second joint shortening; III to VI are marked with transverse irregular interruptions lined with a thin membrane, while the terminal and subterminal joints contain sensitive glands, as do also these joints in the larva and apterous female. Length 4 to 5 mm. Expanse 10 to 12 mm.'"

All the forms of *Pem. fraxinifolii* Riley were found on the same trees and at the same time but these differ very materially from the above.

11. **Pemphigus vagabundus** (Walsh).

Walsh, Proc. Ent. Soc. Phil., I, p. 306 (1862). *Byrsocrypta vagabunda.*
Packard, Guide to Study of Ins., p. 524, 2d Ed. (1870). *Pemphigus vagabundus.*
Thomas, Ins. Ill., 8th Rep., p. 151 (1879).
Oestlund, Syn. Aph. Minn., p. 22 (1887).

Stem-mother: Very large, subglobose, pale yellowish green. Head brownish. Antennae 4-jointed; III very long, IV with an unguis nearly as long as the remainder of the joint; I, II and III pale, IV dusky. Eyes imperfect but quite distinct and black. Beak reaching to middle coxae, black tipped. Legs short, pale, with brownish joints and tarsi. Coxae brown. Length of body 5.10 mm., width 4.25 mm.

Pupa greenish yellow. Antennae 6-jointed; VI with unguis longer than III. Legs, wing-pads and antennae pale, tips of antennae and tarsi dusky.

Winged viviparous female: Head and thorax shining black. Eyes dark red. Antennae reaching to rear of thorax, black, with paler articulations; III with 8–10 transverse sensoria, as long as IV, V and VI without the unguis and about as long as VI with its unguis; IV, V and lower part of VI subequal; unguis of VI twice as long as the lower part; III cylindrical; IV, V and lower part of VI club-shaped. Wings delicate; subcostal and stigma conspicuous, yellowish brown, the latter rather short; oblique veins very slender, hardly perceptible. Abdomen greenish, showing the embryos very plainly. Legs blackish. Beneath the fore part of the body is dusky, the mesosternum black and the abdomen pale yellowish green. Length of body 2.70 mm., to tip of wings 4 mm.; alar expanse 7.50 mm.

Forming a large irregular gall at the ends of twigs of cottonwood (*Populus monilifera*) and balsam poplar (*Populus balsamifera*). Weeping Water, Lincoln, Squaw Canyon, Ashland. The past season galls were found June 13 containing stem-mother

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and pupae, and from these winged females were bred June 17. My observations coincide with those of Oestlund, that the galls are deserted by the insects during July and August. I have been able to find the galls occupied in the latter month a few times; generally they are empty by the last of July. Some of the trees in Lincoln and Ashland are so badly infested with these insects that the large blackish galls render them very unsightly. The insects seem to affect the same trees year after year.

Specimens in collection of the University of Nebraska (nos. 10, 11) and of the U. S. National Museum (no. 129).

12. **Pemphigus walshii** n. sp.

Stem-mother: Globose, yellowish white. Head with top and front black, below pale. Beak reaching almost to second coxae. Antennae blackish, 4-jointed; I and II short and thick, III longest, cylindrical; IV half as long as III, slender, cylindrical. Legs brown. Length of body 1.45 mm., width 1.07 mm., length of antennae 2 mm. Young stem-mother yellowish white, antennae indistinctly 6-jointed. Beak reaching to or beyond hind coxae. Tarsi 2-jointed. Abdomen covered more or less with flocculent matter which is generally arranged in longitudinal rows of flocculent spots on the dorsum. Honey tubes appearing as circular openings.

Winged form: Black. Head and thorax shining. Antennae black, reaching beyond the tip of the thorax; III–VI conspicuously annulate, III with 21–25 rings, IV with 5–7, V with 8 and VI with 80 and a short claw bearing on its tip 3 short, bristle-like hairs; I short and inconspicuous, II short but broad, appearing almost spherical, III–IV cylindrical with rather small articulations; III 0.2 mm. long, II 0.08 mm., V 0.80 mm., VI, including claw, 0.12 mm. Wings large, roughened with minute scales; veins slender, brown, first to second discoids originating near each other, the first somewhat sinuate, the second straight till near the margin of the wing when it curves gradually toward the body; third discoid very slender, the basal third obsolete (many specimens show a small bunch near the margin of the wing). Subcostal heavy, smoky-bordered on its front margin. Stigma whitish with a smoky, black posterior margin caused by the continuation of the subcostal. Stigmal vein rather obtuse curved at the basal third, then straight and the apical third recurved. Hind wings with slender light brown veins. Two anterior pair of legs dark brown to black with tibia and bases of femora paler, posterior pair all black; rather small and slender. Tarsi distinctly 2-jointed and with long, slender claws. Abdomen blackish pulverulent. Length of body 1 mm., to tip of wings 2 mm.

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Forming a club-shaped pedunculated gall on the upper side of leaves of white elm (*Ulmus americana*).

The gall is from one half to one inch long and while growing has much the appearance of the gall made by *Tetraneura ulmi* of Europe. The stem-mother and wingless young were found at Ashland, June 11, 1890, and the fully developed winged form was collected at Lincoln (Dinges) June 29, 1889.

No specimens in either collection.

Subfamily **SCHIZONEURINAE**

Genus **Schizoneura**

13. **Schizoneura americana** Riley.

Riley, Bull. U. S. Geol. Sur. Ter., Vol. V, No. 1, p. 4, pl. I, fig. 1 (a to h) (1879).

Thomas, Ins. Ill., 8th Rep., p. 202, fig. 44 (1879).

Oestlund, Syn. Aph. Minn., p. 27 (1887).

"Impregnated egg: 0.50 mm. long, gamboge-yellow, inclining to brown in color, with no especial external sculpture.

"First generation: Stem-mother pale yellowish red, with black members when first hatched, the red deepening and becoming purplish or livid with age. When mature, averaging 3.50 mm. in length, globose or pyriform, with subobsolete honey tubes and six dorsal rows of darker piliferous and tuberculous spots. Antennae 5-jointed, with III more than equaling IV and V together in length.

"Second generation: Differing in no essential respect from the preceding, except that the individuals do not attain so great a size. Bright brownish red when born, they soon become livid brown.

"Third generation: Mature winged female, alar expanse 5 to 5.60 mm. Body dusky, the abdomen slightly reddish; legs either dusky or yellowish red. Antennae as long as head and thorax together, dusky, rarely yellowish, not pilose, but with a few short setous points; 6-jointed, I and II slightly bulbous; III either surpassing or equaling in length IV, V and VI together, which are subequal; the terminal joint usually shortest, the apical subjoint being normal, and in some cases sufficiently constricted to resemble an additional joint; III, IV and V rather distinctly annulated, the constrictions being generally quite deep and producing a moniliform aspect, there being on an average 22 such on III. Tarsi with basal joint distinctly separated into a lobe, the claws strong and in length twice the diameter of the tarsus. Wings hyaline; front pair with veins becoming obsolete at tips; stigma subhyaline, either of a yellowish tinge or somewhat dusky; stigmal vein starting from the middle of the stigma, and

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normally curved; cubital vein obsolete for nearly one third its length, the furcal forming with it almost a point; the terminal distance between first and second discoidals equal to about five times that between their bases (often rather more); terminal distance between furcal and cubital and cubital and second discoidal veins subequal, that between stigmal and furcal slightly shorter, that between second and first discoidals one third greater, and about equal that between stigmal and stigma. Hind wings with the subcostal almost straight, there being a curve where it gives off the discoidal veins, which are obsolete at their extreme base and not confluent with it. (The wing venation is very constant. Out of nearly 100 specimens examined, I have found only an unusual shortening of the cubital in two individuals.) The larva and pupa in this third generation differ from the winged insect in being more reddish and having the antennae ringed with less distinct constrictions, in the legs being paler, in the claws being stronger and in the basal joint of the tarsus being more connate with the terminal joint. They have a distinct annulated elevation at each side posteriorly—a sort of pseudo-honey tube. When first born, they are of a dull yellow, and the antennal joints are more than equal in length.

"Fourth generation: That from the first winged females: Differs from the preceding in the promiscus being much longer, in the antennae having but five joints, the third being somewhat longest and the first the shortest, but all often being much more nearly equal in length, with no annulated constrictions. The color is more decidedly orange. When newly hatched, the thickened end of the promiscus often extends half the length of the body beyond the anus. The legs are long and stout, and the basal joint of the tarsus is distinct, but not separated. The capitate hairs are obsolete. It is born with an enveloping pellicle or pseudovum, and though of a bright red with pale legs at first, soon becomes brownish, with dark members.

"Fifth generation: The counterpart of the second.

"Sixth generation: Second winged: Resembles the third, but usually rather lighter colored, with the wing-veins, the spinous armature of surfaces and the constrictions of the antennae less strong, and with the third joint of antennae rather less in length than the terminal three together.

"Seventh generation: True sexual individuals: Born within an egg-like pellicle. With stout promiscus reaching beyond the middle coxae; the antennae 5-jointed, with the joints subequal. Bark-feeding. Orange in color. Undergoing one molt and then being at once distinguished from the other forms by the brighter orange yellow color, the rudimentary mouth, the more simple eyes (composed of three facets), by the shorter 5-jointed antennae, the joints subequal in length; by the shorter legs, with smaller claws to the tarsi, and more distinct terminal capitate hairs, or pulvilli. The skin is transparent, the body filled more or less with fatty globules. The female is nearly pyriform, and averages 0.40 mm. in length.

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A single egg is visible through the translucent skin, and, according to age, occupies more or less of the whole of the body. The male is narrower and smaller, the penis being bulbous, with a couple of spine-like genital clasps" (Riley).

On leaves of white elm (*Ulmus americana*) curling them into a pseudogall. In the spring generally only the side of the leaf is curled up, but later in the season, especially if the insects are plentiful, all parts of the leaf may be twisted out of shape. The stem-mother always settles upon the under side of the leaf.

These insects hatch out almost as soon as the leaves appear in the spring and do much damage to the trees, especially in cities. Frequently nearly every leaf on a tree will be the abode of one or more colonies of this pest. Found during spring and summer at Ashland, Lincoln, Weeping Water and many other parts of the state, 1888–90.

Specimens in collection of the University of Nebraska (nos. 12, 13, 14, 15) and of the U. S. National Museum (nos. 68, 69, 70).

14. **Schizoneura corni** (Fabricius).

Fabricius, Ent. Syst., IV, p. 214, No. 19 (1794). *Aphis corni.*
Schrank, Fn. Boi., II, p. 108 (1801). *Aphis corni.*
Kaltenbach, Mon. Pflan., p. 168 (1843). *Schizoneura corni.*
Koch, Die Pflan., p. 268, fig. 343 (1854). *Schizoneura vagans.*
Koch, *l. c.*, p. 275, figs. 348, 349. *Aniscia corni.*
Passerini, Gli afidi, p. 38 (1860). *Schizoneura venusta.*
Walsh, Proc. Ent. Soc. Phil., I, p. 304 (1862). *Eriosoma? fungicola.*
Walsh, *l. c. E. cornicola.*
Thomas, Ins. Ill., 8th Rep., p. 138 (1879). *Schizoneura panicola.*
Thomas, *l. c. S. fungicola* and *S. cornicola.*
Buckton, Mon. Brit. Aph., III, p. 107, pl. CX, figs. 1 to 4 (1881). *Schizoneura corni.*
Weed, Psyche, V, p. 129 (1887). *Schizoneura cornicola?*
Osborn, Bull. 22, U. S. Ent. Div., p. 32 (1890). *Schizoneura corni.*

"*Winged viviparous female* (pseudogyna pupifera): Expanse of wings, 6 mm.; length of body, 2 mm.; width of body, 0.80 mm.; length of antennae, 0.90 mm. Black above, except anterior and lateral margins of abdomen, and in many specimens more or less of posterior portion. Beneath black, except prothorax and abdomen (save a black patch in front of anus), which are dull whitish brown. Beak black, except a more or less lighter patch near the base, hairy, reaching posterior coxae. Legs robust, black, except a brownish space at base of anterior femora; thickly

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provided with brown hairs. Antennae robust, beset with brown hairs. Joints I and II short, smooth; III long, with row of tubercles on its outer ventro-lateral surface; IV and V subequal, with tubercles as on three; VI a little longer than V, excavated on its outer lateral surface about two thirds distance from base. Wing veins mostly brown. Stigma brownish with anterior portion darker."

The form found on grass roots differs from this in being lighter colored generally, and in having fewer sensoria on the antennae. This is due to the habitat and to the fact that the root form is not so well developed. I think that there can be no doubt that these two belong to the same species. I find on referring to my notes, that I had noticed the resemblance and could get no satisfactory difference between them before the excellent article by Professor Osborn came out. I have found many individuals on *Cornus* that were lighter colored than those on roots of grass; and have also found the number of sensoria to be quite variable.

Found during the summers of 1888 to 1890, on *Cornus stolonifera, C. asperifolia, C. paniculata,* generally on the under side of the leaves, but frequently so plentiful as to almost completely cover the tree.

The root form is found on *Panicum glabrum, P. crus-galli, P. capillare, Setaria glauca, S. viridis, S. italica, Eragrostis major, Polygonum persicaria, P. pennsylvanicum,* and a number of other garden weeds in the eastern part of the state.

What goes before is found in Bulletin 22, U. S. Ent. Div., in Weed's description from Psyche, V, 129.

Specimens of root form in collection of the University of Nebraska (no. 16).

15. **Schizoneura crataegi** Oestlund.

Oestlund, Syn. Aph. Minn., p. 27 (1887).

Apterous form: General color pale greenish. Eyes very small and imperfect, black. Beak reaching beyond hind coxae. Antennae pale, 6-jointed; I and II small and bead-like, III equal to IV, V and VI together. Legs pale. Honey tubes represented by circular openings, along the edges of which are black lines. Very thickly covered over with white flocculency. The stem-mother is dusky brown, with more or less of a reddish tinge, and has dusky limbs.

Winged form: Head and thorax shining black; abdomen dusky to black-

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ish. Antennae similar to those of *Schizoneura americana;* III longer than IV, V and VI together. Beak reaching hind coxae or abdomen. Wings hyaline, with slender veins; cubital of fore wings distinct for its entire length, though often very slender, branching about midway. In other respects the wings are similar to *Sch. americana.* Legs and tarsi somewhat shorter. Honey tubes are circular openings but slightly raised above the surface of the abdomen. Not flocculent as in apterous but only pulverulent. Expanse of wings 6 mm.

Found on the under side of twigs and young branches of hawthorn (*Crataegus tomentosa* and *C. punctata*). West Point, July 29, 1890. As only one winged specimen was found and that in a bad condition for description I give Oestlund's description of that form.

Specimens in collection of the University of Nebraska (no. 17) and of the U. S. National Museum (no. 72).

16. **Schizoneura lanigera** Hausman.

Specimens from roots of apple in collection of the University of Nebraska (nos. 18, 19).

17. **Schizoneura rileyi** Thomas.

Riley, Ins. Mo., 1st Rep., p. 123 (1868). *Eriosoma ulmi.*
Thomas, Ins. Ill., 8th Rep., p. 136 (1879). *Schizoneura rileyi.*
Riley, Gen'l Ind. Supp. Mo. Rep., p. 87 (1881). *Schizoneura rileyi.*

Stem-mother: Subglobose, rather large, pale green to reddish yellow. Antennae 5-jointed, dusky brown. Legs and coxae brown. Head and anal plates blackish brown. Beak reaching middle coxae, brownish. Eyes small, but distinct, black. Length of body 3 mm., width 2.05 mm.

Pupa varying from pale pinkish to purplish brown. Legs and antennae concolorous. Eyes pale to dark red.

Winged viviparous female: Color light brown to dark purplish brown. Head and thorax darker. Eyes dark red to almost black. Antennae and legs concolorus with body. Antennae 6-jointed, with III longer than any two of the remaining joints taken together, cylindrical; IV, V and VI club-shaped, subequal, or VI the shortest; not annulated as in *Sch. americana.* Wings with heavy blackish subcostal; oblique veins slender, brownish to black; cubital distinct for its entire length and with a fork about one third as long as the vein itself, which curves in an opposite direction to the stigmal vein. Stigma short and broad, dusky with posterior margin blackish. Length of body 2–2.10 mm., to tip of wings 2.50–2.75 mm.

On small branch of elm (*Ulmus americana*), causing an elongated swelling. Ashland, September, 1889. On the same kind

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of a tree at Lincoln, June, 1890, where it worked on both branches and leaves. It causes a curling of the leaves similar to *S. americana,* but the galls can be readily distinguished as those of this species are much more tightly curled than are those of *S. Americana.* This latter species is often to be found on the same tree. They can be easily separated, as they differ in size, antennae, venation and other minor points. My specimens differ somewhat from Dr. Riley's description, but I think that this is his species. It was very plentiful on the elms of Lincoln the past season, and could be seen in every crack in the bark of some trees. As they are always covered with a coat of flocculent matter the trees are rendered very unsightly.

Specimens in collection of the University of Nebraska (no. 20) and of the U. S. National Museum (no. 74).

Genus **Colopha**

18. **Colopha ulmicola** Fitch.

Ashland, June 11, 1890, on *Ulmus americana,* specimens no. 20a and 20b, University of Nebraska collection.

Subfamily **LACHNINAE**

Genus **Lachnus**

19. **Lachnus dentatus** LeBaron.

LeBaron, Ins. Ill., 3d Rep., p. 138 (1872).
Thomas, Ins. Ill., 8th Rep., p. 116 (1879).
Weed, Bull. O. Ag. Exp. Sta., Tech. Ser., Vol. I, No. 2, p. 117, pl. VII, fig. 1 (a and b).

"*Apterous viviparous female:* Body broadly ovate, covered with a dense fine pubescence. Color of body dark ashy gray, lighter posteriorly; antennae, legs (except basal two thirds of femora and ring at base of tibiae, which are reddish brown), tubercular cornicles, tubercle on middle of abdomen, beak and six transverse rows of six small circular spots on dorsum of abdomen, the two middle spots being about half as large as those at the sides, black. On the dorsum of the abdomen, slightly back of the middle and coinciding with the position of the two middle dots of the fourth row of spots is a prominent conical tubercle. Honey tubes reduced to flattened tubercles. Head large, subquadrate. Beak reaching to first abdominal segment. Antennae short, little more than twice as long as the head; III long. Length of body 5 mm.

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Winged male: Body black, with a grayish pile which on the abdomen gives it a distinct gray color; abdomen with transverse rows of black dots; honey tubes black as is also the prominent conical tooth on the middle of the abdomen; antennae piceous throughout, except in some cases in which the third joint is brown; legs piceous, except proximal half of femora and in some cases more or less of the proximal portion of the tibiae, which are reddish brown; beak black, except at base where it is brownish; wing insertions and sides of mesothorax yellowish or reddish brown; wings subhyaline, costal vein and stigma piceous, remaining veins brown. Antennae short, stout, provided with numerous spinose hairs and ventral surface of III to VI tuberculate, III long, equal to IV plus V; IV short, one third shorter than V, which is slightly longer than VI, the latter being distinctly swollen in the middle. Length of body 5 mm., to tip of wings 9 mm." (Weed).

On bark of young shoots and branches of willows (*Salix* sp.). Lincoln, November 1, 1888; Ashland, October 10, 1890.

Specimens in collection of the University of Nebraska (nos. 21, 22, 23) and of the U. S. National Museum (no. 76).

20. **Lachnus flocculosa** n. sp.

Apterous viviparous female: Head brown. Antennae pale brown or in young specimens more or less yellowish; almost or quite half as long as the body; I and II subequal, III longer than IV plus V, these latter subequal; VI with its short pointed spur only about three fourths V; III and IV cylindrical, V and VI somewhat club-shaped; whole of antennae covered with long, spreading, bristle-like hairs. Eyes dark red. Beak reaching behind the hind coxae, black tipped. Legs pilose with dorsal ends of femora and tibiae and tarsi brown to black; hind pair of legs generally darker and equaling the body in length. The second joint of the tarsi very long. Abdomen greenish or reddish brown, oval, with a marginal row of impressed blackish dots. Honey tubes with a broad conical base and flaring mouth; concolorous with the abdomen and with only rim dusky or becoming dusky towards the apex. Anal plates brown. Whole insect hairy and very thickly covered with flocculent matter. Length of body 1.90 to 2 mm.; antennae 0.95 mm.

Pupa: Very similar to the preceding but with the body generally more green colored and paler. Wing-pads dusky to almost black.

Winged female: Not found.

No specimens in either collection.

21. **Lachnus ponderosa** n. sp.

Apterous viviparous female: Large, brownish, pulverulent. The thoracic segments and the first abdominal segment marked with large dark brown

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spots. Antennae hardly one third the body in length; two basal joints, dusky; III, IV and V yellowish white, with dusky to black tips; VI short, thick and bead-like, black; claw short, the transition scarcely distinguishable. Eyes dark red. Legs with bases of femora and a broad ring on each tibia, yellowish white, rest black; hind legs long, the rest moderately so. Beak very long, reaching almost to the tip of the abdomen in some specimens. Abdomen with blackish brown marginal spots, three rows of impressed black dots on each side and a larger double row on the median line, the two posterior pairs of which run together, forming two larger transversely elongated spots behind the honey tubes. Honey tubes conspicuous, dark brown, broadly conical, with a thickened rim. Length of body about 4 mm., of beak about 2.40 mm. The body somewhat hairy; legs, antennae and apex of abdomen especially so. Tail very broadly conical, brown.

Winged viviparous female: Head and thorax black. Prothorax brownish. Antennae hardly reaching the posterior margin of the thorax, the two basal joints dark brown with whitish ring at apex; VI black, the rest with the larger basal portion and the tips yellowish white; III somewhat longer than IV and V taken together; V longer than IV; all the joints covered with slight raised places from which proceed long hairs. Eyes dark red. Beak reaching to or often beyond the middle of the abdomen, black pointed. Legs much as in apterous form, except that the front femora are nearly or quite black and the rest of the legs have generally much more black (sometimes the front tibiae are all black). Wings delicate, pointed, hardly as long as is common in this genus, costal and subcostal heavy, dark brown; discoidals slender, the cubital being at times almost subobsolete. Stigma long, brown, shape typical of the genus. Stigmal vein almost straight. Abdomen with two brown spots at the base, one on each side of the median line; paler than in the apterous form, many of the brown markings being represented only by a brownish stain; impressed dots and honey tubes as in the apterous form, the segment preceding the tail with a transverse row of five bristles arising from spots each side of the median line and the preceding segment with smaller bristles similarly placed. Tail short, broad and rounded, bordered with brown. Apical segment and anal plates dark brown, the former hairy. Each side of abdomen with a row of about 7 small tubercles. Length of body about 4.05 mm., to tip of wings about 5.15 mm.

Winged male: Similar to the above in color and markings, the abdominal markings rather paler. The wings are more slender and pointed. Beak reaching beyond the tip of the abdomen, with a long, acute black tip. Length of body 2.70 mm., to tip of wings 5 mm., beak 2.60 mm.

The abdomen and thorax in all forms is marked with large marginal and dorsal blotches of white pulverulence. This together with the banded legs gives the insect a very pretty variegated appearance.

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Found on *Pinus ponderosa* var. *scopulorum*. The apterous form was found by Professor Bruner at Belmont in July, 1889. On June 18, 1890, it was collected in both forms at the same place; and a few days later was found in great numbers at War Bonnet Canyon. It is one of the finest aphids that I have ever seen; its general appearance readily distinguishing it from any other species of the genus.

Cotypes in collection of the University of Nebraska (no. 24) and of the U. S. National Museum (no. 78).

22. **Lachnus rileyi** n. sp.

Apterous form: General color light olive brown, more or less pruinose; fusiform; head rather broad; eyes red; antennae over half the body in length, yellowish brown, dark at tips; legs generally darker than body, covered with bristly black hairs; honey tubes represented by a blackish ring. Whole body covered with long black bristly hairs.

Winged form: General color olive brown; pruinose; head broad, dark, with a central black stripe. Antennae blackish brown; III longest, its base pale. Eyes red. Thorax blackish. Legs black, with bases of femora and the upper half of the tibiae yellow; hind legs very long; all of tarsi very distinctly 2-jointed. Wings finely punctured; first and second branches coming out close together; cubitus obsolete at base, generally with only one branch (a few specimens show two branches); all the oblique veins very slender and delicate; costal and subcostal prominent; stigma very long, lanceolate, dusky; stigmal vein nearly straight. Honey tubes as in apterous form. Entire body hairy.

On *Pinus sylvestris* and *P. strobus,* growing on the university campus, October 4, 1888.

Joints III, IV, V are irregularly covered with numerous sensoria. This species has a few points in common with *Schizoneura pinicola* Thomas. The one branched cubitus shows the connection between *Schizoneura* and *Lachnus* already noticed by Kaltenbach, Thomas, Fitch and others. I think, however, that this irregularity in venation does not keep it from *Lachnus*. All the other characters belong to that genus.

Type in collection of the U. S. National Museum (no. 79).

23. **Lachnus? smilacis** n. sp.

Apterous viviparous female: On account of the dense pulverulence with which the insect is covered, it has a bluish gray appearance; when this is

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removed the insect is dark olive green. Antennae and legs reddish, the former but little more than one third as long as the body, on inconspicuous tubercles; II longer and more slender than I; III, IV, V and VI subequal in length; III thickest, the rest becoming successively slenderer; VI wtih a very short claw; III and VI subcylindrical, IV and V rather club-shaped. Head small. Eyes small, black. Beak pale, reaching to or beyond the hind coxae. Abdomen large and swollen, somewhat wrinkled. Honey tubes tubercle-like, inconspicuous, black, scarcely noticeable in the maturer individuals but easily seen in younger ones. Tail wanting. Legs short, the hind pair not reaching the tip of the abdomen in the larger specimens; hairy. Tarsi concolorous with legs, long, 2-jointed, with long claws. The very small head and thorax and the very large abdomen gives the insect a very characteristic balloon-shaped appearance. Antennae with only a few scattered, short, bristle-like hairs, generally two or three being at the apical end of each joint. Body without hairs of any kind except the apex of the abdomen which has a few bristle-like hairs. Length of body about 5 mm., width about 2.75 mm., antennae 1.90 mm., beak 1.20 mm.

In very young individuals the body is somewhat angled, the antennae 5-jointed and the beak reaches beyond the tip of the abdomen. The legs are very long and the eyes somewhat rudimentary.

This is only referred to this genus provisionally. The legs, eyes and general appearance are quite different from typical members of the genus; but the beak, tarsi, honey tubes and antennae are similar to those of *Lachnus*. The winged form, if there is one, is necessary for a correct location of the species. It will probably be found to belong to a new genus.

On stem, leaf-stalks and leaves of *Smilax herbaceae*. Fremont, July 31, 1890.

Type in the collection of U. S. National Museum (no. 77). [This species is *Pemphigus attenuatus* Osborn-Sirrinne.]

Subfamily **APHIDINAE**

Tribe **CALLIPTERINI**

Genus **Chaitophorus**

24. **Chaitophorus bruneri** n. sp.

Apterous viviparous female: Very dark green, almost black. Antennae not half the body in length, two basal and three apical joints dusky to black, rest pale. Head dark green. Thorax pale with darker bands. Abdomen with alternate dark and light transverse bands on the front part, then one broad dark green band covering two thirds of its dorsal surface

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and some paler markings at the tip. Honey tubes very pale green, longer than broad. Tail dark, short and broad. Entire body hairy but the hairs are thinner and shorter than in most species of this genus.

Winged viviparous female: General color of a lighter green than the apterous form. Antennae as in that form but darker. Head black. Eyes dark red. Neck green. Prothorax brownish. Thorax dark brown to black. Wings with yellowish insertions and heavy smoky black bands running along all the veins. Stigma short, broad and brown. Hind wings with only faint brown margins to the veins. Front pair of legs dusky, second and third pairs black with base of femora pale. Abdomen green, with an outer marginal row of small brown dots and these followed by a row of larger brown spots, and transverse bands of brown on each segment. Honey tubes pale yellowish green, as long again as broad. Tail short, conical, hairy and dark brown. Length of body 2.55 mm., to tip of wings 3.95 to 4 mm.

This species is by far the largest I have ever seen, belonging to this genus. In coloration it is similar to *Chaitophorus populicola* Thomas, but differs in many points, besides being a much larger species. Found on leaves of *Populus tremuloides,* War Bonnet Canyon, June 21, 1890. Named for Professor Lawrence Bruner in recognition of the aid he has rendered in the preparation of this work.

Cotypes in the collection of the University of Nebraska (no. 25) and of the U. S. National Museum (no. 38).

25. **Chaitophorus cordatae** n. sp.

Apterous form: Green, legs and antennae yellowish green, tarsi and tips of antennae dusky. The maturer forms have more or less of dark green spots on the abdomen, which are sometimes arranged in two longitudinal stripes. In a few individuals the dark green spots are replaced by brown ones. The whole insect is covered with long white hairs.

Winged form: Antennae about one half the body in length; I brownish; II, III and sometimes IV yellowish, remainder brown to black; III equals IV and V, IV and V are subequal, VI is one half V and about one third VII. Head dark brown, front rounded, hairy. Eyes red. Neck greenish yellow. Prothorax dark brown, with curved margins and much narrowed in front. Thorax dark brown with yellowish margins, making it appear as though marked by a broad longitudinal band nearly as broad as the prothorax. Wings with yellowish insertions, slender, with rather conspicuous brownish veins. Stigma very prominent, dusky, broad. Stigmal vein curved gradually for its entire length. Beak short. Abdomen greenish, with marginal spots and transverse bands of brown on each segment.

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Honey tubes conspicuous, brown. Tail short, brown margined. Abdomen with rather broad, brownish tip. Front pair of legs all yellowish; second and third pairs with dusky femora and yellowish tibiae. All with dusky tarsi. Length of body about 1.90 mm., to tip of wings 2.75 mm.

Very close to *Chaitophorus populi* (Linn.) and *C. populifoliae* (Fitch), but differing in coloration, size, markings and color of honey tubes, as well as feeding on a different plant.

On leaves and young branches of *Salix cordata,* Squaw Canyon, June 24, 1890.

Type in the collection of the U. S. National Museum (no. 39).

26. **Chaitophorus nigrae** Oestlund.

Oestlund, List Aph. Minn., p. 49 (1886).
Oestlund, Syn. Aph. Minn., p. 40 (1887).

Apterous form: General color dull blackish brown. Body flat, ovate, covered with long white hairs, dorsum more or less tuberculate, especially when the lice are young. Antennae rather more than half as long as the body, with pale base and growing darker towards the tip, hairy. More or less yellowish along the sides of the abdomen.

Winged form: Head and thorax black. Antennae almost as long as body, hairy, black, with base of III paler; III longest. Beak hardly reaching middle coxae. Wings with slender blackish brown veins; stigma short and broad, dusky brown. Legs with distal half of femora and tarsi blackish, rest pale. Abdomen very dark green to black. Honey tubes about as long as broad, paler than abdomen. Tail short, knobbed. Length of body 1.50 mm., to tip of wings 2.50 mm.

Found on leaves and young shoots of willow (*Salix nigra* and *S. longifolia*). Lincoln, October, 1888. A further study of this species will probably result in showing that it is but a variety of *C. viminalis* Monell.

Specimens in collection of the University of Nebraska (no. 26) and of the U. S. National Museum (no. 41).

27. **Chaitophorus populicola** Thomas.

On *Populus monilifera,* Lincoln, July 11, 1890, specimens in the collection of the University of Nebraska (nos. 27–32).

28. **Chaitophorus salicti** (Schrank).

Schrank, Fn. Boi., II, p. 103 (1801). *Aphis salicti.*
Kaltenbach, Mon. Pflan., p. 121 (1843). *Aphis salicti.*
Passerini, Gli afidi, p. 32 (1860). *Chaitophorus salicti.*

Apterous viviparous female: Long oval. Color yellowish green, with

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darker green markings, these often running together, giving the insect a dark green color. Head and spot on each side of the prothoracic segment brown. There is generally a yellow median stripe running the entire length of the body; on each side of this line are three rows of small brown tubercles, and on the margin of the abdomen is one or more rows of larger brown tubercles with one to several hairs proceeding from each, and sometimes there is a marginal row of brown spots along with the tubercles. Antennae about half as long as body, dusky, VII longer than III. Legs short, hairy, dusky yellow. Honey tubes very short, hardly raised above the surface of the abdomen, brown. Tail not noticeable. Length of body 1.80 mm.

Apterous oviparous female: Ovate, dark brownish green; a yellow median line and some yellowish markings between the segment bands, especially on the thorax and behind the honey tubes. Dorsum tuberculate, hairy. Eyes very dark red. Legs and antennae as in viviparous female, but darker colored generally. Honey tubes short, brown, with a yellow ring around the base on the abdomen. Tail short, yellow, knobbed. Length of body 1.50 mm.

Winged male: Head and thorax shining black. Antennae almost as long as the body; pale at base, dusky to black toward tip. Beak not reaching middle coxae. Front pair of legs yellowish with femoral tips and tarsi dusky; middle pair with more duskiness; hind pair with femora blackish, tibiae all yellow but tip; tarsi dusky. Wings with yellowish insertions, subcostal and stigma, and prominent, blackish oblique veins. Abdomen greenish yellow, with a central longitudinal band of greenish brown, widening behind (it is formed by short transverse bands on each segment which run together more or less) and numerous small dots on each side of this; sometimes darker marginal spots can be seen, but these are variable. Honey tubes longer and paler than in the other forms. Tail as in oviparous female. Length of body 1.80 mm., to tip of wings 3.15 mm.

On willow (*Salix* sp.). Ashland, October 10, 1890. The winged viviparous female was not found, but Kaltenbach describes it as being similar to my winged male.

Specimens in collection of the University of Nebraska (nos. 33, 34) and of the U. S. National Museum (no. 47).

29. **Chaitophorus spinosus** Oestlund.

Oestlund, List Aph. Minn., p. 49 (1886).

Oestlund, Syn. Aph. Minn., p. 38 (1887).

Apterous viviparous female: Greenish yellow, with a large dorsal spot of dark green, which is often more or less broken up into transverse bands. Whole dorsum covered with black spine-like hairs proceeding from tuber-

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cles. These hairs are most numerous along the middle of the abdomen, where they are arranged in two irregular broad rows, one each side of the median line. Front very spiny. Antennae about half the length of the body; tips of II–V and all of VI and VII black, rest pale; VII but little longer than VI; with few scattered hairs. Eyes red. Legs short, rather stout, yellowish with dusky tarsi. Honey tubes yellow, with a large thickened rim at the tip, 0.17 mm. long.

Winged viviparous female: General color yellowish green. The black hairs of the apterous form are wanting. Head brown. Thorax black. Antennae rather more than half the body in length; III as long as IV and V together, VI longer than VII; colored as in the apterous female. Eyes red. Wings rather large, with a broad blackish brown stigma and robust costal and subcostal. All the veins of both front and hind wings with broad smoky black bands. Second discoidal of front wing very sharply curved toward the body near its apex. Front pair of legs yellowish, with dusky joints and tarsi; middle pair darker, only base of femora and middle portion of tibiae yellow; hind pair nearly all black. Abdomen with a longitudinal row of tubercles each side of the median line, each segment bearing two tubercles, one each side of the line. Honey tubes as in apterous female but rather longer. Tail short and knobbed, hairy, concolorous with abdomen. Length of body 2.60 mm., to tip of wings 4.40 mm.

On the under side of leaves, along the midrib and larger veins of Bur oak (*Quercus macrocarpa*). Very plentiful during the seasons of 1889 and 1890 at Ashland. The winged form was first found May 14, 1890, and by the twenty-fifth they were very numerous. The apterous oviparous females were found plentifully in September and October. They do not differ from the other apterous form except in shape and in having the abdomen drawn out posteriorly as is common in this genus. All of the forms of this species have less hair on the antennae than any other species known to me. The antennae are more like *Callipterus,* but all the other characters are those of *Chaitophorus.*

Specimens in collection of the University of Nebraska (no. 35) and of the U. S. National Museum (no. 49).

30. **Chaitophorus viminalis** Monell.

Monell, Bull. U. S. Geol. Sur. Ter., Vol. V, No. 1, p. 31 (1879).
Thomas, Ins. Ill., 8th Rep., p. 200 (1879).

Apterous individuals: Varying from pale green to light yellow, with two darker vittae on the abdomen which are often obsolete. Entire insect covered with long white hairs.

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Winged individuals: Head and thorax black; abdomen black, except the margins and tail, which are yellow. Honey tubes a little longer than thick, yellowish, often slightly fuscous. Antennae hairy; VII filiform, almost as long as the three preceding taken together. Wings hyaline. Length of body 1.52 mm., to tip of wing 2.54 mm. (Monell).

Apterous form on leaves of heart-leaved willow (*Salix cordata*). Weeping Water, August 18, 1890. Monell says the venation of the wings is exceedingly variable.

Specimens in collection of the University of Nebraska (no. 36) and of the U. S. National Museum (no. 50).

Genus **Callipterus**

31. **Callipterus asclepiadis** Monell.

Monell, Bull. U. S. Geol. Sur. Ter., Vol. I, p. 29 (1879).
Thomas, Ins. Ill., 8th Rep., p. 197 (1879).
Oestlund, Syn. Aph. Minn., p. 42 (1887).

Apterous individuals: Uniformly yellowish or whitish; somewhat tuberculate on dorsum, with long white capitate hairs. Antennae shorter than body, all but two first joints black tipped, VII longer than VI.

Pupa: Similar to apterous form, with pale wing-pads, antennae generally shorter and body longer.

Winged individuals: General color yellow. Antennae filiform, about the length of the body, VII nearly twice as long as VI, all but two basal joints black tipped. Beak reaching to second pair of coxae. Thorax with a dark marginal stripe on the sides. Legs pale. Wings with a dusky brown, irregular band running from the apex of the second discoidal to the apex of the second branch of the cubitus and to apex of stigmal vein, and another band extending from the apex of the first discoidal to the base of the cubitus, but becoming scattered before reaching that point. Veins blackish. Stigma short, broad, angled, tapering abruptly at its outer end. Distance between the tips of first and second discoidals twice that between the tip of the second discoidal and the tip of the first branch of cubital. Hind wings with veins only very slightly smoky at the tips. Abdomen with four irregular rows of brown spots and smaller spots scattered among these. Honey tubes short, slightly longer than broad, yellow. Length of body 1.50 to 1.60 mm., to tip of wings about 2.80 mm.

On under side of leaves of milkweed (*Asclepias syriaca*), generally only a few are to be found on a leaf. Weeping Water, September 8, 1889; Ashland, August 25, 1890. I find the venation rather variable. This species has the habit of jumping when disturbed. It is able to jump several inches.

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Specimens in collection of the University of Nebraska (nos. 37, 38) and of the U. S. National Museum (no. 19).

32. **Callipterus caryae** Monell.

Monell, Bull. U. S. Geol. Sur. Ter., Vol. V, No. 1, p. 31 (1879).
Thomas, Ins. Ill., 8th Rep., p. 199 (1879).

Apterous individuals: General color pale greenish yellow. Legs and antennae pale, the latter with the tip of each joint black. Head with four capitate bristled tubercles on front. Dorsum with four rows of brownish tubercles, each with a single capitate bristle on its summit.

Pupa: As in apterous form, with whitish wing-pads.

Winged individuals: Pale yellow. Antennae about as long as the body, pale, the tip of each joint black; VII generally longer than VI. Thorax pale olive. Legs all whitish but the last joint of the tarsi which is dusky. Abdomen with four rows of blackish tubercles on its dorsum; these, however, lack the capitate bristles and the rows are not so regular as in the larvae and pupae. Honey tubes subobsolete. Tail short and knobbed. Wings hyaline. Veins pale; second branch of cubitus equidistant from apex of wing and the first branch, rather widely forked. Stigma short and broad, obtuse at both ends, dirty white with dusky base. Stigmal vein subobsolete. Length of body 1.75 mm., to tip of wings 2.85 mm.

Found on under side of leaves of hickory (*Carya amara*) and walnut (*Juglans nigra*). Ashland, August 23, 1890.

Specimens in collection of the University of Nebraska (nos. 39, 40) and of the U. S. National Museum (no. 20).

33. **Callipterus discolor** Monell.

Monell, Bull. U. S. Geol. Sur. Ter., V, No. 1, p. 30 (1879).
Oestlund, Syn, Aph. Minn., p. 41 (1887).
Thomas, Ins. Ill., 8th Rep., p. 108 (1879). *Myzocallis bella.*

Apterous form: Color pale yellowish, with about four rows of dark green spots along the dorsum; sometimes these are almost obsolete, especially in the younger individuals. Covered with long capitate hairs. Antennae pale, with the articulations black.

Winged form: General color greenish yellow. Head somewhat darker. Thorax with a dusky band on either side. Abdomen with four rows of irregular brownish spots, often with smaller dots between them, the two middle rows more or less confluent just above the honey tubes. Head pointed in front. Eyes red. Antennae about as long as the body; tips of III–VI dusky to black; III longest, VII longer than VI. Legs pale. Tarsi dusky. Wings with irregular dusky spots, arranged in two oblique bands, which are especially noticeable when the insect is at rest; a smoky patch at tips of all the oblique veins; stigma short. Honey tubes short, greenish yellow. Length of body about 1.75 mm., to tips of wings 3.30 mm.

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On under side of leaves of Bur oak (*Quercus macrocarpa*). Weeping Water, October 10, 1888; Ashland, October, 1889; very plentiful all through the month.

34. **Callipterus punctata** Monell.

Monell, Bull. U. S. Geol. Sur. Ter., V, No. 1, p. 30 (1879).

Thomas, Ins. Ill., 8th Rep., p. 198 (1879).

Apterous form: Pale yellowish; dorsum with small tubercles from which proceed capitate hairs of various lengths. Antennae not reaching honey tubes, the latter longer than broad, concolorous with abdomen. Front with 6–8 very long capitate white hairs and a shorter one on the inner side of I and II, rest of antennae smooth, dusky, jointed; VII longer than VI. Eyes red.

Pupa: Similar, with pale wing-pads.

Winged form: Color much as in apterous form, but with thorax and some few markings on the abdomen darker. Head pointed in front. Eyes red. Antennae shorter than body; pale, with tips of joints III–VI dusky; VII longer than VI, dusky. Wings hyaline, with dusky markings at all the tips of the oblique veins and the base of the stigmal; subcostal and stigma greenish white; the latter broad, angled at the base of the stigmal vein, which is sharply curved. Honey tubes as in the apterous form, but more conspicuous. Legs pale with dusky tarsi. Abdomen not tubercled, but with a few capitate hairs. Length of body 1.70–2.10 mm., to tip of wings 3–3.40 mm.

On under side of leaves of Bur oak (*Quercus macrocarpa*). Ashland, May 28, 1890.

I find specimens which lack the darker markings on the wings and are larger, agreeing with the description of *C. hyalinus,* together with the above; and upon the same leaf specimens with only a part of the markings on the wings. I am of the opinion that *C. hyalinus* is but a variety of *C. punctata.*

35. **Callipterus trifolii** Monell.

Monell, Can. Ent., Vol. XIV, p. 14 (1882).

Apterous form: Yellow. The very young individuals have four longitudinal rows of tubercles each with a single blackish capitate hair. In the maturer individuals the tubercles are not arranged in longitudinal rows (except sometimes the outer marginal row), but are in rather irregular transverse rows on each segment, the whole dorsum being very thickly covered with them, even to the head and thorax. Antennae reaching to honey tubes. Length of body about 1.80 mm.

Pupa: Similar but smaller and with whitish wing-pads.

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Winged form: "Dorsum without conspicuous tubercles. III twice as long as IV; IV and V subequal; VI and VII subequal. Wings with marginal cell hyaline. Veins bordered with brown. Basal half of stigmal vein subobsolete and not thickened and dusky at the base. Length of body 1.60–2 mm., to tip of wings about 3.30 mm., antennae 2.40 mm." (Monell).

Ashland, apterous form quite common on leaves of red clover (*Trifolium pratense*) during the month of September, 1890.

Specimens in collection of the University of Nebraska (nos. 41, 42) and of the U. S. National Museum (no. 22).

36. **Callipterus ulmifolii** Monell.

Monell, Bull. U. S. Geol. Sur. Ter., Vol. V, No. 1, p. 29 (1879).
Thomas, Ins. Ill., 8th Rep., p. 111 (1879). *C. ulmicola.*
Oestlund, Syn. Aph. Minn., p. 42 (1887). *C. ulmifolii.*

"Pale whitish yellow. Apterous individuals: Tuberculate, with capitate hairs, which disappear when the insect acquires wings."

"Winged individuals: Antennae as long as the body; III, IV and sometimes V slightly dusky at apex; apical joint a very little longer or shorter than the sixth. Wings hyaline; all the veins and especially the stigmal vein subhyaline. Dorsum with four long, spine-like tubercles on its basal portion and with various shorter tubercles on the apical portion."

"Length 1.77 mm., to tip of wings 3.04 mm."

On under side of leaves of elm (*Ulmus americana*), evidently causing them to cup slightly. Lincoln, October 4, 1888, and June 13, 1890. Ashland, June to July, 1890.

Specimens in collection of the University of Nebraska (nos. 43, 44) and of the U. S. National Museum (no. 23).

37. **Drepanosiphum acerifolii** (Thomas).

Thomas, Bull. Ill. Lab. Nat. Hist., 2, p. 4 (1878). *Siphonophora acerifolii.*
Thomas, Ins. Ill., 8th Rep., p. 47 (1879). *Siphonophora acerifolii.*
Monell, Bull. U. S. Geol. Sur. Ter., V, 1, p. 27 (1879). *Drepanosiphum acerifolii.*
Oestlund, Syn. Aph. Minn., p. 46 (1887). *Drepanosiphum acerifolii.*

Apterous form: Pale green. Antennae very long, pale, with articulations and the very long thread-like VII dusky. Eyes red. Legs pale, with dusky joints and tarsi. Honey tubes very large at base, tapering, with a rimmed apex, pale. Tail none.

Winged form: Color gray varied with white and brown. Head and thorax brown, with various whiter markings. Antennae much longer than

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the body, pale, with darker articulations, growing darker towards the tips, VII dusky to black; as long as, or becoming much longer than, III; the latter with a single row of sensoria. Beak short, not reaching to middle coxae. Legs pale, with dusky tips and tarsi, rather long. Abdomen with several large, more or less brown, tooth-like tubercles on the basal segments of the dorsum, each tipped with a short stiff hair, and marginal spots of brown. These latter are often obscure or wanting. Wings large; veins slender, more or less bordered with brown, especially the cubital and stigmal veins. The border becomes broadened into a black patch at the margins of the wing. Stigma short and broad, angled, gray, with dusky margins. Stigmal vein very sharply curved at first, then almost straight, with the smoky band thickest at each end. Marginal cell very broad. Honey tubes very much enlarged at the base, dusky, 0.35 mm. Tail short and knobbed, pale. Length of body about 2.40 mm., to tip of wings 3.95 mm.

Very common on maple (*Acer dasycarpum*). Ashland, Lincoln, Weeping Water. The past season at the former place they were so thick as to cover almost all plants in the vicinity of the maples, when the winged form was most plentiful (September–October). It is a very pretty louse and varies much in size and coloration.

Specimens in collection of the University of Nebraska (nos. 45–49) and of the U. S. National Museum (no. 226).

Genus **Melanoxanthus**

38. **Melanoxanthus bicolor** Oestlund.

Ashland, on *Salix,* October 10, 1890, specimen no. 49a, University of Nebraska collection.

Tribe **APHIDINI**

Genus **Hyalopterus**

39. **Hyalopterus pruni** (Fabricius).

Fabricius, Ent. Syst., IV, p. 213 (1794). *Aphis pruni.*
Kaltenbach, Mon. Pflan., p. 52 (1843). *Aphis pruni.*
Koch, Die Pflan., p. 22, figs. 29, 30 (1854). *Hyalopterus pruni.*
Buckton, Mon. Brit. Aph., II, p. 110, pl. LXXV, figs. 1–3 (1879). *Hyalopterus pruni.*
Thomas, Ins. Ill., 8th Rep., p. 82 (1879). *Hyalopterus pruni.*

Apterous viviparous female: Long oval, pale green with darker mottlings. Dorsum with a more or less distinct longitudinal stripe of darker

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green. Generally very pulverulent. Eyes brown. Honey tubes shorter than tail, black. Tail green. Legs pale, with black tarsi.

Pupa: Elongate, nearly linear, green, very pulverulent; head and thorax darker. Eyes red. Antennae two thirds as long as the body, whitish. Legs and wing-pads whitish. Tarsi dusky. Abdomen with sides nearly parallel and drawn out to a gradual point behind; a median line of dark green, a transverse row of impressed dots at base, and a similar row on each lateral margin, also a row of very small tubercles on the sides. Honey tubes hardly as long as the tarsi, dusky. Tail short and conical, pale. Beneath pale green, mesosternum darker; abdomen with a row of marginal dots, corresponding to those above. Length of body 2.40 mm.

Winged viviparous female: Head and thoracic lobes very dark green, rest paler green, more or less pulverulent. Head pointed in front. Prothorax with very small lateral tubercles. Antennae on very small frontal tubercles; about two thirds as long as the body, pale; VII longest; III with a few sensoria. Eyes red. Legs pale, with femoral tips and tarsi dusky, rather slender and the hind pair rather long. Beak very short, not reaching middle coxae, in many specimens hardly reaching beyond the front coxae. Wings hyaline, with slender brownish veins and long, pointed, grayish stigma; cubital subobsolete at immediate base; second branch arising much nearer the apex of the wing than to the base of the first branch. Abdomen marked as in pupa, but more oval in outline, drawn out into a conspicuous, hairy, concolorous tail, which is at least as long as the honey tubes; these latter as in pupa. Length of body 2.42 mm., to tip of wings 3.70 mm.

On under side of leaves of cultivated plums, on the same trees with *Myzus cerasi* and *Phorodon humuli*. Ashland, June, 1890; Weeping Water, June, 1889.

Genus **Aphis**

40. **Aphis albipes** Oestlund.

Oestlund, Syn. Aphid. Minn., p. 52 (1887).

Apterous viviparous female: Reddish brown, paler beneath. The young are greenish. The thorax a transverse dash on each side of the anterior of abdomen, a similar one at base of honey tubes, a short longitudinal dash between and in front of the honey tubes on the dorsum, and some of the apical segments white and pulverulent. Antennae about half the length of the body; white, except tips of IV and V, and all of VI, which are blackish; VII longest. Beak reaching beyond middle coxae. Eyes red. Honey tubes about two thirds as long as the tarsi, dusky to black. Legs white with dusky tarsi. Tail short, conical, whitish.

Winged viviparous female: Antennae not as long as the body, black;

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III–V with a few small sensoria; VII longer than III. Eyes red. Beak reaching middle coxae. Head and thorax dark brown to black. Prothorax brownish, with small lateral tubercles. Wings with yellowish insertions, subcostal and stigma, the latter rather short and broad, somewhat pointed; veins slender, blackish; second branch of cubital nearer the first than to apex of wing. Abdomen greenish brown, with darker transverse markings. Legs pale, with dusky joints and tarsi. Honey tubes short (0.10 mm.), subclavate, black. Tail about as long as honey tubes, acutely conical, whitish. Anal plates blackish. Length of body about 2.15 mm., to tip of wings 3.60 mm.

On under side of snowberry (*Symphoricarpus racemosus* var. *pauciflorus*) and Indian currant (*S. vulgaris*). Elmwood, Ashland, Belmont, War Bonnet Canyon. More common than *A. symphoricarpi* Thomas. It causes the leaves to curl as does that species. My specimens differ somewhat from Oestlund's description, but I am sure it is his species. The stigma can not be said to be long, however. The white markings distinguish it very readily from Thomas's species.

Specimens in collection of the University of Nebraska (nos. 50, 51) and of the U. S. National Museum (no. 54).

41. **Aphis annuae** Oestlund.

Oestlund, List Aph. Minn., p. 43 (1886).

Oestlund, Syn. Aph. Minn., p. 66 (1887).

Apterous viviparous female: Very dark green. Antennae shorter than body, dusky. Abdomen short and broad. Honey tubes about twice the tarsi, black, or with pale base. Tail short and conical.

Winged viviparous female: Head and thorax shining black; the former pointed in front. Antennae shorter than body, on very inconspicuous tubercles, black; VII longer than III. Prothorax without lateral tubercles, black. Wings long and narrow; second branch of cubitus much nearer the apex of the wing than to the first branch. Abdomen dull green, generally with a marginal row of black spots. Legs pale to dusky. Honey tubes about twice the tarsi, black. Tail cylindrical, about half the honey tubes, black. Length of body about 2 mm., to tip of wings about 3.50 mm.

On leaves, sheaths and stems of bluegrass (*Poa compressa*). Ashland, September to October, 1890. I think the insects are generally lighter colored earlier in the season.

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Specimens in collection of the University of Nebraska (no. 52) and of the U. S. National Museum (no. 52).

42. **Aphis apocyni** Koch.

Koch, Die Pflan., p. 97, figs. 131, 132 (1854).

Thomas, Ins. Ill., 8th Rep., p. 94 (1879).

Pupa: Yellowish green to light olive green. Head brownish. Antennae about two thirds as long as the body, pale, with dusky tips. Eyes dark red. Legs pale, with dusky tarsi. Wing-pads and thorax pale. Honey tubes longer than tarsi.

Winged viviparous female: Head and thorax black. Eyes dark red. Antennae shorter than body, pale, darker toward the tips. Beak reaching middle coxae. Prothorax blackish, with lateral tubercles. Wings hyaline; insertions, subcostal, stigma and the slender oblique veins yellowish; discoidals uncommonly straight. Legs yellowish, with dusky joints and tarsi; sometimes the hind pair are darker. Abdomen yellowish green, with darker marginal spots and transverse band on the segments behind the honey tubes. Honey tubes but little longer than tarsi, dusky black. Tail about half as long as honey tubes, blackish, upcurved, rather acute. Beneath the sternum and coxae are dusky black; abdomen pale yellowish, green; anal plates dusky black. Length of body 2.10 mm., to tip of wings 3.60 mm.

On dogbane (*Apocynum cannabinum*), generally along the upper branches and flower stalks. Elmwood, June 9, and Ashland, June 11, 1890.

Oestlund is evidently wrong in considering this the same as *A. asclepiadis* Fitch. My specimens differ much from the typical *A. asclepiadis,* though I have found that species on this same plant, but only when in close proximity to *Asclepias,* upon which it was also very numerous. The only thing in which my specimens differ from Koch's description is in being generally of a lighter color.

Specimens in the collection of the U. S. National Museum (no. 53).

43. **Aphis artemisicola** n. sp.

Apterous form: Body reddish wine-colored. Antennae shorter than body, black, with three first joints paler. Eyes black. Head, thorax and abdomen reddish wine colored, the latter with marginal row of black dots. Legs reddish, with dusky to black joints and tarsi. Honey tubes black, 0.35 mm. long. Tail acute, hairy, black, about one half the honey tubes in length.

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Winged form: Antennae shorter than the body, on inconspicuous tubercles, black; VII longer than III. Head and thorax black. Neck and prothorax reddish. Wings rather heavy and large, with yellowish insertions. Abdomen, honey tubes and tail as in apterous form except that the honey tubes and tail are slenderer. Legs all black. Beak reaching beyond second pair of coxae, black tipped and very acute. The abdomen is very large in both forms; sometimes almost spherical, giving the insects a broadly pear-shaped outline. Length of body 2.83 mm.

A very large aphis, moving quickly when disturbed, with a jerky motion. In size and general appearance it is very like a *Siphonophora;* but the generical characters are undoubtedly those of *Aphis.*

On *Artemisia cana,* generally on the upper leaves and ends of branches. Squaw Canyon, June 24, 1890.

Cotypes in collection of the University of Nebraska (no. 53) and of the U. S. National Museum (no. 56).

44. **Aphis atriplicis** Linnaeus.

Linnaeus, Fn. Sv., p. 1000 (1761).
Schrank, Fn. Boi., II, 109, 1196 (1801). *Aphis chenopodii.*
Kaltenbach, Mon. Pflan., p. 107 (1843).
Buckton, Mon. Brit. Aph., II, p. 87, pl. LXV, figs. 4–7 (1879). *A. atriplicis.*

Apterous viviparous female: Green, more or less pulverulent, elliptical. Antennae pale, with dusky tips, hardly half the body in length. Eyes dark red. Legs short, pale, with slightly dusky tarsi. Honey tubes very slender, subclavate, slightly dusky, especially at the tips, hardly as long as the conspicuous, upcurved, concolorous tail.

Winged viviparous female: Somewhat larger than apterous female, ovate. Head and thorax black. Eyes dark reddish brown. Antennae hardly two thirds the body in length, black, with pale base, minutely annulate; III longest, with a single row of large sensoria. Beak short, not reaching the middle coxae. Prothorax brownish, without lateral tubercles. Wings with yellowish insertions and subcostal and robust, smoky black oblique veins. Stigma dusky, rather long, but very obtuse. Legs dusky to blackish. Honey tubes as in apterous female, but more dusky. Tail more slender and acute. Abdomen green, with brown marginal spots and transverse bands, these latter often more or less obsolete. Length of body 1.60 mm., to tip of wings 3 mm.

Very common on pigweed (*Chenopodium* sp.) in June and July, and sometimes on dock (*Rumex* sp.). The lice cluster

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along the midrib on the upper side of the leaves and cause the edges to roll upwards, enclosing the lice in its folds. My specimens agree with the description given by Kaltenbach much better than with that by Buckton.

Specimens in the collection of the U. S. National Museum (no. 58).

45. **Aphis canae** n. sp.

Apterous form: General color green, darker on head and central subcircular spot on abdomen. In some individuals this spot is very irregular, giving the abdomen a mottled appearance. There is generally a whitish transverse band just behind the thorax. Antennae about half the body in length, pale, tips black. Legs pale, tarsi black. Honey tubes black, about 0.15 mm. long. Tail short, conical, black.

Winged form: Head and thorax black. Antennae shorter than the body, two basal joints dusky; III and lower part of IV paler, remainder dusky to black; IV but little shorter than III, V shorter than IV, VI two thirds V and equaling VII. Whole of antennae annulated. Prothorax without lateral tubercle. Wings rather delicate, with slender brownish veins. Stigma dusky. Stigmal vein curved gradually for its entire length. Legs with upper part of femora and upper part of tibiae pale, remainder black. Abdomen green with some darker mottlings. Honey tubes black, 0.16 mm. long, slightly swollen above the base. Tail short, conical, black. Length of body 1.24 mm. to tip of wings 2.25 mm. The apterous viviparous female is about 1.60 mm. in length. It also has the abdomen very broad and frequently the antennae nearly all black.

A very pretty species found on the stem and leaves of *Artemisia cana,* generally in company with *Siphonophora artemisiana.* Squaw Canyon, June 24, 1890.

Cotypes in collection of the University of Nebraska (no. 54) and of the U. S. National Museum (no. 60).

46. **Aphis chrysanthemicola** n. sp.

Apterous viviparous female: Green, slightly pruinose. Antennae about one half the body in length; I, II, III and sometimes IV pale, remainder dusky black. Eyes red. Beak reaching to third pair of coxae, acute, black tipped. Legs with all of the femora and tibiae green. Tarsi black. Honey tubes long, reaching almost or quite to the tip of the abdomen, slightly swollen near the tip, with green bases and dusky tips. Tail one third the honey tubes, concolorous with the abdomen. Length of body 1.25 to 1.50 mm.

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Pupa: Similar to apterous form, but with shorter and darker antennae, honey tubes and tail, and legs with dusky tibiae. Wing-pads dusky.

Winged viviparous female: General color dark green (lighter in immature individuals). Head brownish black, pointed in front. Antennae black, with paler bases, on inconspicuous tubercles, about two thirds the body in length; III rather longer than VII; VI, VII and part of V annulated; III, IV and V with a few circular sensoria. Eyes black. Neck and prothorax green. The latter without lateral tubercles. Thorax with a broad central black band, sides yellowish green. Wings with rather pointed apex, yellowish insertions and very prominent black veins. Stigma dirty white. Stigmal vein only slightly curved. The marginal cell but little broader than the stigma. Second branch of cubitus generally much nearer the first branch than the apex of the wing. Legs yellowish green, with tips of tibiae dusky; tarsi dusky to black. Abdomen green with dark green marginal dots and two or three brownish green bands behind the honey tubes. Honey tubes reaching to base of tail, otherwise as in apterous form. Tail as in apterous form, or sometimes slightly dusky. Length of body about 1.50 mm., to tip of wings 3 mm.

On both sides of the leaves of *Chrysanthemum* in the greenhouse of the botanical department of the State University, December 30, 1890. Brookings, S. D., 1894–95.

Cotypes in the collection of the University of Nebraska (nos. 55, 56).

47. **Aphis cnici** n. sp.

Apterous viviparous female: General color reddish brown. Antennae but little more than half the body in length, dusky, with pale base. Legs with base of femora yellowish, rest dusky to black. Honey tubes twice the tarsi in length, black. Tail short, acute, black.

Pupa: Color, size, honey tubes, legs, antennae and tail as in apterous form. Head rather smaller. Wing-pads dusky to black. Insect as large as the winged form.

Winged viviparous female: General color reddish brown. Head small in comparison to the size of the insect, very dark reddish brown to black. Antennae black, pale at base, reaching to or slightly beyond the base of the honey tubes, on inconspicuous frontal tubercles; III and VII subequal; III and IV with sensoria. Neck and prothorax greenish brown, the latter with lateral tubercles, a blackish line on its front margin and a brown dot on either side of its center. Beak very long, reaching beyond the third pair of coxae, two last joints blackish, last very acute. Thorax with lobes, ventral surface and a spot in front and just below the base of each wing, black; membrane yellowish brown. Wing insertions, costal, subcostal and stigma yellowish; oblique veins very slender, pale brown; the discoidals

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and cubitus originating equidistant and continuing very nearly parallel to the margin of the wing. Stigmal vein curved rather sharply and evenly its entire length. Second branch of cubitus originating, generally, equidistant from the first branch and the apex of the wing. Legs with the basal portion of femora yellowish, all the rest black. While the insects are living the abdomen appears as if without any darker markings, but when mounted in balsam a row of brown spots can be seen on each margin, and within these a row of impressed dots; apical segment drawn out into a blackish point, causing the insect to appear as if supplied with two tails. Honey tubes black, very finely annulated, 0.50 to 0.60 long. Tail short (0.15 mm.), very acute, blackish. The whole insect in all forms is covered with numerous short, bristly hairs which are most abundant on the legs and antennae. Length of body about 3 mm., to tip of wings about 5.15 mm.

On stems, branches and leaves of thistle (*Cnicus* sp.), in very large colonies. War Bonnet Canyon, June 23, 1890.

This is the largest aphis that I have ever seen. It is somewhat like *A. cardui* Linn., but is much larger, differently colored and differs in many other respects as will be seen by the description. I do not think that it can possibly be that species, especially as given by Buckton. There is another aphis found on the same plant, which I take to be *A. cardui*, though it differs in a few points from that species, as given by European authors. Buckton thinks that his insect is different from *A. cardui* of Passerini and it is possible that my insect may be Passerini's species; but as I have no description of his insect I cannot determine that point. I think it probable, however, that they are distinct. Oestlund notices the long beak of his *A. cardui* and the same feature is to be noticed in this insect and in an undetermined species feeding on the same plants. When we remember that these plants generally have thick skins supplied with many long hairs, the necessity of a long beak is at once recognized.

Cotypes in collection of the University of Nebraska (no. 57) and of the U. S. National Museum (no. 64).

48. **Aphis cucumeris** Forbes.

Ashland, August, 1890, on cucumber and hollyhock, specimens nos. 58 and 59, collection of the University of Nebraska.

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49. **Aphis euphorbiae** Kaltenbach.

Kaltenbach, Mon. Pflan., p. 94 (1843).

Koch, Die Pflan., p. 89, figs. 119, 120 (1854).

Apterous viviparous female: Broadly ovate, general color dark bluish black; thickly pulverulent. Antennae reaching nearly to base of honey tubes, pale yellowish. Eyes black. Prothoracic and thoracic segments well defined, the former with lateral tubercles. Abdomen arched. Legs pale yellowish. Honey tubes and tail subequal in length, both dusky to black.

Pupa: Rather larger; legs and antennae rather dusky. Thorax and wing-pads almost white, with pulverulence. Otherwise similar to female.

Winged viviparous female: General color much as in the apterous female but with less pulverulence and head and thorax shining black. Prothorax with lateral tubercles. Antennae and legs pale, or sometimes more or less dusky. Wings with yellowish insertions, subcostal and stigma, the latter angled at the ends; second branch of cubital arising much nearer the apex of wing than to first branch. Abdomen carinate; dorsum with transverse rows of impressed pits. Honey tubes slender, 0.20 mm. long, dusky to black. Tail fully as long as honey tubes and generally lighter colored. Anal plates blackish. Length of body 2.10 mm., to tip of wings 3.70 mm.

On upper leaves and flower stalks of common spurge or milkweed (*Euphorbia corollata*). Weeping Water, August 22, 1890. Easily distinguished by its dark color and white pulverulence.

Specimens in collection of the University of Nebraska (nos. 60, 61) and of the U. S. National Museum (no. 67).

50. **Aphis frangulae** Kaltenbach.

Kaltenbach, Mon. Pflan., p. 64 (1843). *A. rhamni.*

Koch, Die Pflan., p. 119, figs. 161, 162 (1854). *A. rhamni.*

Koch, *l. c.*, p. 142, figs. 192, 193. *A. frangulae.*

Apterous viviparous female: Size small, general color yellowish green to dark olive green, with two or three darker green stripes on the dorsum, which run together more or less. Eyes dark red. Antennae about two thirds as long as the body, yellowish, with dusky tips. Prothoracic segments with prominent lateral tubercles. Honey tubes hardly as long as the tarsi, pale yellowish to dusky. Tail almost as long as honey tubes, obtuse, yellowish to dusky. Legs yellowish with dusky tarsi. Length of body 0.90–1.20 mm.

Winged viviparous female: Rather smaller than apterous female. Head and thoracic lobes black. Antennae black, with part of III and IV pale; shorter than body. Prothorax with lateral tubercles. Beak reaching middle coxae. Legs rather short, yellowish, with tips of femora and tibiae and tarsi blackish. Wings delicate, hyaline, with yellowish insertions, subcostal

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and stigma. Abdomen yellowish green, with generally three longitudinal dark green stripes as in apterous. Honey tubes blackish, about twice the length of the yellowish tail. Anal plates brown.

Along the midrib on the under side of leaves of buckthorn (*Rhamnus lanceolatus*). July, Fremont, Wabash. When mounted in balsam the dark green stripes disappear and a row of impressed dots can be seen along the carinae. One of the smallest aphids that I am acquainted with.

Specimens in collection of the University of Nebraska (no. 62) and of the U. S. National Museum (no. 66).

51. **Aphis helianthi** Monell.

Monell, Bull. U. S. Geol. Sur. Ter., V, 1, p. 26 (1879).
Oestlund, Syn. Aph. Minn., p. 52 (1887).

Apterous viviparous female: Pale to dark green, with various darker markings, especially just before the honey tubes, where there is a transverse band. Eyes blackish. Honey tubes dusky, 0.20 mm. long. Tail short, acute, more or less dusky.

Winged viviparous female: Head and thorax dark brown to black. Abdomen green, with a dark green transverse band just before the honey tubes and generally some dark marginal spots. Antennae about two thirds as long as the body, black; III as long as IV and V together and longer than VII; IV and V subequal. Eyes very dark brown to black. Honey tubes dusky to black, 0.20 mm. long, subcylindrical. Tail as in apterous form. Wings hyaline, with a broad, dusky stigma; second branch of cubital arising much nearer the apex of wing than to base of first branch. Length of body 1.80 mm., to tip of wings 3.20 mm.

Very common on under side of leaves of sunflower (*Helianthus annuus*), generally but not always corrugating them. June–September. Ashland, Lincoln, Weeping Water.

Specimens in collection of the University of Nebraska (nos. 63, 64) and of the U. S. National Museum (nos. 82, 83, 332).

52. **Aphis impatientis** Thomas.

On *Impatiens pallida,* August 22, 1890, specimens nos. 65 and 66, collection of the University of Nebraska.

53. **Aphis lilicola** n. sp.

Apterous viviparous female: Color varying from green to dark green and variously mottled. Slightly pulverulent, more conspicuously so on the head and margins of abdomen. Antennae very slender and thread-like.

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about half the length of the body, whitish, dusky at base and apices Beak reaching beyond middle coxae. All of the coxae brown. Legs pinkish white, with dusky femoral tips and black tibial tips and tarsi. Abdomen distinctly carinated, often with one or two marginal rows of dark impressed dots. Honey tubes greenish black, about twice the tarsi in length. Tail either same color as abdomen or sometimes darker.

Pupa: Much smaller than apterous form and much more thickly pulverulent. Legs, antennae and honey tubes as in the above. Bases of wing-pads white, remainder black.

Winged viviparous female: Green. Head blackish brown. Antennae brown to black, with paler articulations, on inconspicuous tubercles, reaching almost or quite to base of honey tubes. Neck green. Prothorax brown, with very small but distinct lateral tubercles. Thorax blackish brown. Wing insertions and subcostal yellowish. Stigma conspicuous, dusky, with a yellowish tinge. Veins brown to blackish. Legs greenish to dusky, with dusky to black joints and tarsi. Abdomen green, with marginal spots, irregular transverse rows of brownish spots, a large brown spot at the inner side and to the rear of the base of each honey tube, and one or two more or less distinct transverse bands between these and the apex. Honey tubes dark brown to black, about twice the tarsi in length. Tail short, conical, obtuse, hairy, yellowish to dusky green. Anal plates brown. The ventral surface of the thorax has a very characteristic broad, blackish transverse band, which has two large lobes on its posterior edge. The coxae are blackish brown. Length of body 1.80 mm., to tip of wings 3.50 mm.

Found on the growing points of lily (*Lilium candidum*) in greenhouse. Lincoln, January 12, 1891.

This may be *A. lilii* Lichtenstein (ined.), mentioned by him in his *Les Pucerons*, p. 100 (1885). I have not been able to find his description so give my louse the above name, which it can hold till it is shown certainly to be his species. It is a very well characterized species.

Cotypes in collection of the University of Nebraska (nos. 67, 68) and of the U. S. National Museum (no. 15).

54. **Aphis lonicerae** Monell.

Monell, Bull. U. S. Geol. Sur. Ter., Vol. I, p. 26 (1879).

Oestlund, Syn. Aph. Minn., p. 55 (1887).

Thomas, Ins. Ill., 8th Rep., p. 104 (1879). *Chaitophorus lonicera.*

Apterous form: General color green, very pulverulent, more or less covered with flocculency. Antennae hardly two thirds the body in length, dusky at tips. Eyes very dark red or black. Beak reaching beyond the

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middle coxae. Honey tubes mammiform, shorter than broad. Tail hardly if at all distinct. Length of body about 3 mm. Pupa similar, with pale greenish wing-pads.

"Winged individual: Green, often with two darker green longitudinal stripes. Head and thorax brownish. Antennae about as long as the body, frontal tubercles short, but distinct; apical joint filiform, as long as the two preceding taken together. Beak reaching below the middle coxae. Wings hyaline, stigma rather long. Honey tubes scarcely projecting above the surface of the abdomen. Lateral edge of the abdomen with four or five very short, green, mammiform tubercles. Tail not perceptible. Length 2.54 mm., to tip of wings 4.57 mm." (Monell).

On under side of leaves of wild honeysuckle (*Lonicera glauca*). Ashland, October 5, 1889, and May 10, 1890. These insects have at first sight much the appearance of *Schizoneura* on account of the great amount of flocculent matter covering them and the liquid globules found in the curled up leaf, which curling is caused by the punctures made by the beaks of the lice. The only winged specimen that I found had the thoracic tubes all black.

Specimens in collection of the University of Nebraska (no. 69) and of the U. S. National Museum (no. 88).

55. **Aphis lonicericola** n. sp.

Apterous viviparous female: Reddish purple, pulverulent. Tarsi, tips of antennae and tips of honey tubes dusky. Head small. Antennae reaching to base of honey tubes; the two basal joints frequently dusky; very slender and thread-like; III longest. Beak short, hardly reaching to the middle coxae. Legs slender, pale. Abdomen broad, very much swollen, arched and wrinkled; abruptly pointed at each end. Honey tubes very slender, yellowish, dusky tipped, about 0.37 mm. long. Tail short, acutely conical; same color as the honey tubes. Tip of abdomen and anal plates brown. The large abdomen and small head give the insect a very characteristic, broadly ovate appearance. Beginning with the middle of the margin on each side, it tapers in almost exactly the same proportion toward either end. Length of body 2.50 to 2.80 mm.

Pupa: Color as in apterous female. Size smaller. Head larger. Eyes darker. Legs, antennae, honey tubes and tail similar. Wing-pads brownish.

On wild honeysuckle (*Lonicera parviflora*), causing the leaves to curl much more than *A. lonicerae* Mon., but with very little if any flocculent matter. Ashland, October 5, 1889, and May 14, 1890.

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Cotypes in the collection of the University of Nebraska (no. 70) and of the U. S. National Museum (no. 87).

56. **Aphis lugentis** n. sp.

Apterous viviparous female: Dark green. Legs and antennae black, the latter half the body in length. Abdomen with very distinct margins upon which is a row of impressed dots. Honey tubes black, nearly twice the tarsi. Tail black, half the honey tubes.

Pupa: Lighter colored, with dusky black head, antennae, legs, honey tubes, wing-pads and tail; the latter conical, short and broad.

Winged viviparous female: Antennae black, hardly half the body in length; III longer than VII, but shorter than VI and VII together; VII very slender. Eyes dark red. Head dusky black. Neck green. Prothorax darker, with small, slender, lateral tubercles. Thorax black. Legs all black but the immediate bases of femora. Wing insertions yellowish. Wings hyaline, with slender brownish veins; cubitus with second branch but very little nearer to the apex of the wing than to the first branch. Stigma smoky black, rather short, acute at outer end. Abdomen green, with four large black spots on each lateral margin, a row of impressed dots just within these, a few irregularly placed brown spots over the dorsal surface, a transverse band of brown between the honey tubes and one on each segment from there to the tip. Honey tubes not quite twice the tarsi in length, black. Tail black, hairy, about half as long as the honey tubes. Length of body 2.30 to 2.85 mm., to tip of wings 3.95 to 4.15 mm.

This very large aphis is found on the stem, leaves and flower stalks of *Senecio lugens.* War Bonnet Canyon, June 23, 1890.

Cotypes in the collection of the University of Nebraska (no. 71) and of the U. S. National Museum (no. 91).

57. **Aphis lutescens** Monell.

Monell, Bull. U. S. Geol. Sur. Ter., V, 1, p. 23 (1879).

Thomas, Ins. Ill., 8th Rep., p. 191 (1879).

Apterous viviparous female: General color bright lemon yellow. Outline broadly ovate. Head dusky. Eyes very dark red or black. Antennae hardly half the body in length, dusky, with black tips. Beak reaching beyond middle coxae. Legs dusky to black, generally with bases of femora and a portion of tibiae yellowish. Honey tubes tapering from a broad base, reaching to tip of abdomen, blackish. Tail short, club-shaped, obtuse, hairy, blackish. Anal plates blackish.

Pupa: Very similar but with shorter honey tubes, conical tail and size rather smaller. Wing-pads dusky.

Winged viviparous female: General color bright lemon yellow. Antennae somewhat pilose, a little shorter than body, the length of joints

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quite variable; in some specimens the third is subequal to the preceding, while in others it is one third longer. VII filiform, very much longer than III. Honey tubes somewhat dusky, gently tapering from base to apex, apical diameter about two thirds that of the base, about three times as long as the tarsi. Tail dusky yellow, blunt at apex, when fully extended about half the length of the honey tubes. Fore wings hyaline; stigma dusky yellowish, acute at apex, which is opposite the middle of the stigmal vein. Stigmal vein in one regular curve. Discoidal veins of hind wings nearly parallel; subcostal comparatively straight. Length of body 1.65–2.03 mm., to tip of wings 3.04–3.54 mm. (Monell).

On milkweed (*Asclepias incarnata* and *A. syriaca*). Elmwood, Lincoln, Ashland. June–September.

Specimens in the collection of the U. S. National Museum (nos. 89, 90).

58. **Aphis maidis** Fitch.

Fitch, Ins. N. Y., I, p. 318 (1856).
Thomas, Ins. Ill., 8th Rep., p. 89 (1879).
Garman, Ins. Ill., 14th Rep., p. 23 (1885).
Garman, Misc. Es. Ec. Ent., p. 46 (1886).
Oestlund, Syn. Aph. Minn., p. 56 (1887).

ROOT FORM

Apterous viviparous female: Head black above. Prothoracic segment black, the following three body segments each with a transverse dusky mark on their middles. Abdomen pale green, with black marginal spots and with numerous smaller specks over the surface. Antennae dusky at tip and slightly also at base. Eyes reddish brown. Honey tubes black. Tail dusky, preceded by two transverse black marks. Abdomen beneath with two transverse black marks before the tail, otherwise nearly uniformly pale green below. Beak black at base and tip. Coxae, femora chiefly, tips of tibiae and tarsi black. Body widely oval in outline. Antennae short, about half the length of the body and head; I and II equal in length; I largest; III longest; IV and V subequal and about equal to VI. Honey tubes short, tapering toward the tip, not swollen, extremities flared. Tail short and wide. Length of body 1.40 mm., width of body 0.93 mm., antennae 0.57 mm.

Pupa: Head obscurely dusky. Thorax obscure reddish brown. Abdomen pale, dull green, without spots. Antennae dusky at tip only. Eyes reddish brown. Wing-pads obscurely dusky. Honey tubes black. Tail dusky. General color below greenish. Beak dark at base and tip. Tarsi and tips of tibiae dusky. Length of body 1.61 mm., width 0.30 mm.

Winged oviparous female: Head black. Thorax brownish black. Abdo-

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men above pale green with about three marginal black spots and numerous small dark specks over the surface. Antennae dark, with pale at the articulations. Prothorax pale in the middle; mesothorax and metathorax chiefly brown. Honey tubes black, with some black at their bases, chiefly inside. Tail dusky, with several transverse dusky marks before it. Thorax chiefly dark below, with interspaces about bases of limbs brownish. Under side of abdomen pale green; two transverse dark marks before the tail. Legs mostly black; tibiae for basal two thirds pale. Length of body 1.80 mm., of antennae 0.70 mm., of honey tubes 0.12 mm.

Oviparous female: General color dull green, body covered with a glaucous bloom. Above head dusky, prothorax chiefly dusky, the three succeeding segments each with a median transverse dusky blotch; all segments behind prothorax with a marginal and submarginal series of dusky specks on each side. Below head and prothorax dusky, two dark spots outside the coxa of the middle leg, a dusky line before the coxa of the hind leg, abdominal segments with two series of dusky specks on each side and a pair of spots before the tail. Antennae dusky, the lower part of III and IV paler. Eyes brownish red. Beak dusky. Anterior and middle legs with coxae, femora except bases, tibiae at tips and tarsi except at bases dusky. Posterior leg excepting the extreme base of femur black. Honey tubes black. Tail with black border. Body stout, its greatest width at about the middle. Outline of the front seen from above incurved medially. Antennae with I and II equal in length, I stouter; III about equal to IV and V together, IV and V nearly equal in length and similar in form. Honey tubes short, not swollen in middle. The limbs and tail have the usual pubescence of members of the genus *Aphis*. Length of body 2.27 mm., width 1.20 mm., antennae 0.80 mm., honey tubes 0.20 mm.

AERIAL FORM

Apterous viviparous female: General color pale green, with tail, honey tubes, greater part of beak, antennae and legs black. Head with two broad, approximated, longitudinal bands of dark brown, which give the prevailing color. Abdomen with the usual marginal black spots and black patch about the base of the honey tubes. Antennae dark at base and apex. Eyes reddish brown. Anterior legs mostly pale. Beak dark at base and apex. More slender than the female of the root form and of a brighter green color. Honey tubes slightly swollen in the middle. Length of body 1.97 mm., width 1 mm., antennae 0.75 mm., honey tubes, 0.17 mm.

Pupa: Head dark brown, presenting the appearance of two longitudinal dark bands. Body chiefly pale green. Wing-pads, honey tubes and tip of tail black. Antennae chiefly dark. Beak dark at base and tip. Legs nearly all dark, tibiae pale proximally. Length of body 1.60 mm., width 0.62 mm., antennae 0.70 mm., honey tubes 0.12 mm.

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Winged viviparous female: Head black. Thorax chiefly black above. Abdomen pale green, faintly bluish at the sides, with three marginal spots on each side preceding larger spots which surround the bases of the honey tubes. Antennae chiefly black. Honey tubes black. Tail green, edged with black. Segments behind the tail dark-edged. Head and thorax beneath chiefly black. Abdomen pale green, with two transverse black marks preceding the tail. Legs pale at their articulations; middle part of tibiae often pale. Beak chiefly black. Body more slender than that of the female of the root form. Antennae rather long; IV and V each longer than VI. Honey tubes moderately long, swollen in the middle. Length of body 2 mm., width 0.87 mm., antennae about 0.85 mm., honey tubes 0.20 mm., to tip of wings about 3.35 mm. (Garman).

The root form was found at Weeping Water, June, 1889, on the roots of corn, so plentiful as to destroy a large part of five acres of grain. The corn was just coming through the ground or the largest but one or two inches high. The lice were clustered along the young roots and stalks under the ground in great numbers, causing the stalks to wilt and shrivel up. The first notice of the presence of lice at a hill of corn was invariably given by the appearance of a colony of ants (*Lasius alienus* Forst.?), which are responsible principally for the rapid spread of the lice over the field.

The aerial form was found in abundance at Weeping Water in July and August, 1890, on corn and sorghum, generally more plentiful on the latter. They were generally a little larger than Garman's specimens, and the honey tubes were not so much swollen; in many cases (in both winged and apterous forms) they were not swollen at all. These lice are destroyed by the larva of a *Syrphus* fly, which seemed to be quite effectually keeping them in check. Professor Forbes, who has been experimenting on the life history of this aphis for some years past, expresses doubt as to these two forms belonging to the same species. He has as yet been unable to establish a complete connection.

Specimens of the "aerial form" in the collection of the University of Nebraska (nos. 72, 73).

59. **Aphis malvae** Walker.

Walker, Cat. Hom. Brit. Mus., IV, p. 970 (1852).
Koch, Die Pflan., p. 125, figs. 169, 170 (1854).

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Buckton, Mon. Brit. Aphid., II, p. 42, pl. XLIX, figs. 1, 2 (1879).

Apterous viviparous female: Somewhat oval. Head brown between the antennae, but sometimes the color is reddish. Rest of body yellow or pale green. Legs rather short, pale green; tarsi darker. Honey tubes straight and cylindrical. Tail but little developed. The vertex and tail pilose. Length of body about 1.50 mm., of honey tubes 0.38 mm.

Winged viviparous female: Much smaller than the wingless female. Head, part of prothorax and all of thorax rich brown. Vertex convex, not pointed. Abdomen arched. Rest of insect fine yellow, with indistinct lateral punctures. Antennae shorter than body, pale brownish yellow. Legs, honey tubes and tail pale green. Tarsi grayish. Eyes red. Wings short and rounded at the tips; insertions and subcostal yellow; veins brown; stigma gray. Length of body about 1.25 mm., of honey tubes 0.25 mm., expanse of wings 4.81 mm.

Apterous oviparous female: Very much of the form and color of the viviparous female. Antennae half the length of body. Honey tubes olive (Buckton).

The apterous form of an aphis which agrees exactly with Buckton's description was taken at Ashland November 1, 1890, on the under side of the leaves of hollyhock (*Althaea* sp.). Winged insects were taken later (January 23, 1891) on *Hibiscus* in greenhouse at Lincoln. These agree very well with Buckton's description, but some specimens have black head and thorax, very small lateral tubercles on the prothorax, a dark green spot at the base of each honey tube and the honey tubes and tail black, thus agreeing with the description given by Koch. There is no doubt that these belong to the same species and I think that the darker ones are the more mature individuals. Apterous and viviparous females were taken often on *Hibiscus* later.

Specimens in the collection of the University of Nebraska (nos. 74, 75) and of the U. S. National Museum (no. 100).

60. **Aphis medicaginis** Koch.

Koch, Die Pflan., p. 94, figs. 125, 126 (1854).

Monell, Bull. U. S. Geol. Sur. Ter., V, No. 1, p. 24 (1879).

Thomas, Ins. Ill., 8th Rep., p. 192 (1879).

Apterous viviparous female: Broadly ovate. The living specimens appear almost black, but when mounted in balsam they have a dark reddish brown color. Legs and antennae pale yellowish, the base and tips of the latter and the femoral tips of the hind pair of legs, all the tibial tips and the tarsi dusky to black. Antennae not half as long as the body; III the

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longest. Honey tubes rather long (0.45 mm.), imbricated, shining black. Tail short, slender, acute, black. Anal plates blackish.

Winged viviparous female: General color of living specimens black. Head and thorax shining black. Prothorax and abdomen dull black (in mounted specimens these latter are dark reddish brown). Prothorax with very small lateral tubercles. Abdomen with three black marginal spots on each side of beak, not reaching to middle coxae. Antennae on inconspicuous frontal tubercles, about half the length of the body, blackish, with III paler and with a few sensoria; III to VII more or less minutely annulate. Hind pair of legs with femora black except the immediate base, the rest with distal ends of femora black; all of tibial tips and tarsi black. Wings with yellowish insertions, subcostal and stigma, the latter with dusky border; oblique veins yellowish brown. Honey tubes and tail as in apterous form, but rather shorter. Anal plates black. Length of body 2 mm., to tip of wings 3.40 mm.

On wild liquorice (*Glycyrrhiza lepidota*). Lincoln, June 3, and War Bonnet Canyon, June 24, 1890. The measurements were taken from the War Bonnet specimens which were somewhat larger than the ones from Lincoln.

Specimens in the collection of the U. S. National Museum (no. 400).

61. **Aphis middletonii** Thomas.

Thomas, Ins. Ill., 8th Rep., p. 99 (1879).
Oestlund, Syn. Aph. Minn., p. 54 (1887).

"*Apterous form:* The color of full grown specimen is leaden gray, with head more or less dusky; abdomen with marginal spots and also commonly some transverse bands of black. Eyes as usual in *Aphis*. Antennae short, about one third or not more than half the length of the body, dusky except at base; III longest. Beak rather long, reaching third pair of coxae (0.50 mm.). Legs more or less dusky. Honey tubes short (0.15 mm.), slightly thickest at base. Tail short, conical, hairy. Anal plates dusky or black. Length of body 1.50 to 1.75 mm."

"*Winged form:* Antennae about half the length of the body; III with several rather large sensoria arranged in almost a regular row. Ocelli present but small, the two lateral ones close to the compound eyes. Beak reaching second pair of coxae. Head and thorax black, abdomen dull green as in apterous, with a lateral row of dusky spots and more or less pulverulent. Wings as usual in the genus. Honey tubes short, almost as long as the tarsi, cylindrical."

On roots of daisy fleabane (*Erigeron ramosus*) and common fleabane (*Erigeron canadensis*). Lincoln, July 20, 1890; golden-

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rod (*Solidago canadensis*), Lincoln, October, 1888. On underground stems of naked broom rape, August 6, 1889, at Alliance (J. G. Smith). The Alliance specimens are larger than those on the composites, being about 1.9 mm. long; they also have VII subequal to or slightly longer than III.

62. **Aphis mimuli** Oestlund.

Oestlund, Syn. Aph. Minn., p. 57 (1887).

Apterous viviparous female: Light green or occasionally becoming darker green or the darker green arranged in longitudinal bands on the dorsum.

Winged viviparous female: General color green. Head and thorax dark brown to black. Antennae pale, with blackish tips; III–V with sensoria; III equal to VII; IV and V subequal; VI three fourths of V. Beak reaching hind coxae. Legs pale, with black femoral and tibial tips and tarsi. Neck and prothorax green, the latter with very slender lateral tubercles. Wings delicate, with slender brownish veins; stigma pointed, dusky; stigmal vein curved its entire length; second branch of cubital nearer the apex of the wing than to base of first branch. Abdomen pale green, generally with a longitudinal dorsal stripe of darker green. Honey tubes rather longer than the tarsi, green. Tail slightly shorter than honey tubes, conical, green. Length of body 1.15 to 1.20 mm., to tip of wings about 1.66 mm.

Found on stems, branches, flower stalks and leaves of monkey flower (*Mimulus ringens*), causing the leaves to curl up. Fremont, July 31, 1890.

Specimens in the collection of the University of Nebraska (nos. 76, 77) and of the U. S. National Museum (no. 94).

63. **Aphis oenotherae** Oestlund.

Oestlund, Syn. Aph. Minn., p. 69 (1887).

Apterous viviparous female: Color from light pea green to dark green. Tarsi and tips of antennae dusky. Eyes black.

Pupa: Green. Tarsi, tips of antennae, wing-pads and tip of beak dusky.

Winged viviparous female: Head and thorax black. Antennae about two thirds the length of the body, black, generally with paler bases; III, IV and sometimes V with sensoria; III and VII subequal; all the joints more or less minutely annulate. Beak of medium length. Prothorax with lateral tubercles, green or in many specimens with a more or less distinct transverse brownish band. Abdomen bright green, with a marginal row of brown or black spots and in many specimens more or less distinct transverse brownish bands, especially on the segments behind the

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honey tubes. Legs with yellowish brown femora and tibiae and black joints and tarsi. Honey tubes about three times the tarsi, brown to black, about 0.30 mm. long. Tail hardly half as long as the honey tubes, acute, from yellowish green to black. Length of body about 1.50 mm., to tip of wings 3 mm.

On upper branches, leaves and seedpods of evening primrose (*Oenothera biennis*). Quite common at Ashland in May, 1890, and October, 1889, and at Lincoln, June, 1890. On *Oenothera serrulata,* War Bonnet Canyon, June 24, 1890. It causes the leaves to curl up somewhat. There seems to be considerable variation in the color of this aphis. The spring forms have generally less dark markings than the summer or fall forms.

Specimens in the collection of the University of Nebraska (nos. 78, 79, 80) and of the U. S. National Museum (nos. 96, 97, 98, 99).

64. Aphis parthenocissi n. sp.

Apterous viviparous female: Uniformly reddish brown. Antennae with two first joints dusky; III, IV and V white; VI and VII black; VII longest. Eyes very dark red. Beak very long, reaching beyond the third pair of coxae. First pair of legs pale, with black joints and tarsi; second pair darker, the tibiae with both ends blackish; third pair all black, but a small portion of the middle of each tibia and the immediate base of the femora. Abdomen arched, very broad in comparison to the small and narrow head and thorax, giving the body a pear-shaped outline. Honey tubes black or sometimes paler at base, 0.28 mm. long. Tail about half as long, rather conical, black. Anal plates blackish brown.

The very young larvae have all parts pale but the tips of the antennae and the tarsi; as they grow older the dark markings become more and more prominent. Length of body 1.60 to 1.80 mm.

Readily recognized by its reddish color and pale, black tipped antennae. It differs from *A. setariae* (Thomas) in having a black tail, paler antennae (the white portion taking in the fifth joint) and a much longer beak. This latter is by far the longest I have ever seen in this genus. In the very young individuals it reaches nearly or quite to the tip of the abdomen.

Found clustering along the midrib of the leaflets and along the petioles of the Virginia creeper (*Parthenocissus 5-folius*), thickly attended by ants. Lincoln, August 7, 1890. I watched the vine upon which it was found very closely till the close of the month

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but was unable to secure any winged specimens. Oestlund mentions finding *A. setariae* (Thomas) on this plant, but I think that it was very likely this species.

Cotypes in the collection of the University of Nebraska (nos. 81, 82) and of the U. S. National Museum (no. 101).

65. **Aphis pentstemonis** n. sp.

Apterous form: Green, with scarcely any darker markings.

Winged form: General color green. Antennae all black or sometimes with slightly paler bases on inconspicuous tubercles; III longest. Head black, rather pointed in front; eyes red, with black tubercle. Neck green. Prothorax brown, with slender lateral tubercles. Thorax with black lobes and green membrane. Wings with slender brownish veins; cubitus with second branch nearer to the apex of the wing than to the first branch; first and second discoidals nearly straight; stigmal vein curved for its entire length. Stigma rather broadly lanceolate, generally obtuse, or short pointed at the outer end. Legs dusky, the hind pair frequently almost black; joints and tarsi black. Abdomen green, with three or four large marginal spots on each side and a row of impressed dots just within these; a brown spot at the base of each honey tube and transverse bands behind these. Some specimens have a few irregular bands on front part of the abdomen, while in some these are wanting and the other dark markings are not so noticeable. Honey tubes one and one half to two times as long as the tarsi, black. Tail one half the honey tubes, rather sharply conical, black. Length of body 2.20 mm., to tip of wings 3.75 mm.

Found on *Pentstemon glaber,* clustering along the flower spikes, stems and leaves. What is evidently the same species was found on *Musenium tenuifolium,* growing near the *Pentstemon.* War Bonnet Canyon, June 23, 1890.

Cotypes in the collection of the University of Nebraska (nos. 83, 84) and of the U. S. National Museum (no. 102).

66. **Aphis rumicis** Linnaeus.

Linnaeus, Syst. Nat., I, 2, p. 734 (1746).
Fabricius, Ent. Syst., IV, p. 213 (1794).
Kaltenbach, Mon. Pflan., p. 81 (1843).
Koch, Die Pflan., p. 140, figs. 190, 191 (1854).
Buckton, Mon. Brit. Aph., II, p. 81, pl. LXIII, LXIV (1879).
Thomas, Ins. Ill., 8th Rep., p. 88 (1879).
Oestlund, Syn. Aph. Minn., p. 61 (1887).

Apterous viviparous female: Color varying from green to brownish.

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Antennae pale, black tipped. Legs pale, joints and tarsi black. Honey tubes and tail black, the latter one half the former. Outline broadly ovate.

Winged viviparous female: General color black, the abdomen sometimes paler. Antennae nearly as long as the body; black, minutely annulate; III longest, with many irregularly arranged sensoria. Head and thorax shining black. Prothorax with a lateral tubercle. Front legs yellow, joints and tarsi black; middle legs darker and hind pair black except the base of femora and upper middle portion of tibiae. Wings with slender veins. Stigma elongate and very acute, dusky. Honey tubes black, 0.30 mm. long. Tail half as long as honey tubes, black, rather acute, hairy. Length of body about 2 mm., to tip of wings 4 mm.

On dock (*Rumex* sp.), generally along the upper branches and flower stalks. Buckton describes both apterous male and apterous oviparous female.

Specimens in the collection of the University of Nebraska (no. 85) and of the U. S. National Museum (no. 113).

67. **Aphis salicicola** (Thomas).

Thomas, Bull. Ill. St. Lab. Nat. Hist., 2, p. 8 (1878). *Siphonophora salicicola.*

Thomas, Ins. Ill., 8th Rep., pp. 63 and 192 (1879). *Siphonophora salicicola.*

Monell, Bull. U. S. Geol. Sur. Ter., V, 1, p. 24 (1879). *Aphis salicicola.*

Oestlund, Syn. Aph. Minn., p. 63 (1887). *Aphis salicicola.*

Winged viviparous female: Head and thorax shining black; prothorax with lateral tubercles; head somewhat pointed in front. Antennae on inconspicuous frontal tubercles; not quite as long as the body, black; III longest, with numerous small, round sensoria. Eyes black. Wings hyaline, with slender brown oblique veins; subcostal and stigma dusky, the latter rather long; cubital obsolete at base, with second branch very much nearer the apex of wing than to the first branch. Legs rather long, nearly all black. Abdomen dark green, with irregular dorsal markings. Honey tubes imbricated, black, 0.28 mm. long. Tail curved upward, dusky, hairy, at least one third as long as the honey tubes. Length of body 1.65 mm., to tip of wings 3.40 mm.

On willow (*Salix discolor*). Lincoln, War Bonnet Canyon. No notes were made from the Lincoln specimens and there were only very young apterous forms in the War Bonnet specimens, so I can give no description of that form. Although this aphid has a few of the characters of *Siphonophora,* it plainly belongs in *Aphis* as now understood.

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Specimens in the collection of the U. S. National Museum (no. 107).

68. **Aphis saniculae** n. sp.

Apterous form: Uniformly green, with honey tubes, tail and legs generally darker than in winged form. Length of body about 1.90 mm.

Pupae: Similar in color, honey tubes and tail lighter; wing-pads brownish. Length of body about 1.50 mm.

Winged female: General color green. Antennae pale to dusky; III darkest, a little longer than VII. III, IV and V with a single row of sensoria; III with the most and V with the least. Head brown. Eyes reddish. Neck green. Prothorax light brown, with lateral tubercles. Thorax brown, with greenish yellow lateral margins. Wings with yellowish insertions, conspicuous brown veins and yellowish stigma. Stigmal vein curved for its entire length. Second branch of cubitus nearer the apex of the wing than to the first branch. Abdomen yellowish green, with three small brown marginal dots on each side and one at the base of each honey tube. Honey tubes and tail blackish, the latter acute, about one half the former. Legs dusky. Tarsi brown to black. Antennae shorter than the body. In a few specimens there are two or three pale brown bands behind the honey tubes. Length of body about 1.50 mm., to tip of wings about 2.50 mm.

On under side of leaves of *Sanicula canadensis,* causing them to curl up into a pseudogall. Ashland, May 30, 1890, and War Bonnet Canyon, June 21, 1890.

Cotypes in the collection of the University of Nebraska (no. 86) and of the U. S. National Museum (no. 109).

69. **Aphis sativae** n. sp.

Apterous form: Very dark greenish brown to almost black. Antennae on inconspicuous frontal tubercles; brown, with base darker and three apical joints blackish; about as long as the body. Beak reaching almost to hind coxae. Legs brown, with the tip of hind femora, all the tibial tips and tarsi blackish. Honey tubes robust, 0.22 mm. long, not quite twice the tarsi, black. Tail short, conical, concolorous with honey tubes. Body short and broad, about 1.55 mm. long.

Pupa: Same color as apterous form and similar in every respect except that the head is rather larger, the size considerably smaller and the body more slender. Wing-pads blackish.

Winged individual: Blackish brown. Head, thorax, antennae, legs, honey tubes, tail and marginal spots on abdomen black. Wings with medium sized, brown veins; the subcostal nearly straight; the costal curved, coming quite near to the subcostal just below the stigma, which is narrow

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and dusky. The wings have a brownish tint. Honey tubes rather shorter than in apterous form. Tail short and broadly conical, hairy. Antennal tubercles less distinct than in apterous form. Length of body generally a little less than that of apterous individuals and outline narrower.

Among the flowers of hemp (*Cannabis sativa*). Weeping Water, October 10, 1888. This cannot be *Phorodon cannabis* Pass., as that species has porrect frontal tubercles and is of a much paler color.

Cotypes in the collection of the University of Nebraska (no. 87) and of the U. S. National Museum (no. 108).

70. **Aphis senecionis** n. sp.

Apterous viviparous female: Dark olive green. Legs dusky to blackish brown, with black joints and tarsi. Antennae not half the body in length. Abdomen with a row of impressed dots on each side. Honey tubes dusky brown.

Pupa: Lighter green, with blackish wing-pads; legs, antennae and honey tubes dusky.

Winged viviparous female: Antennae but little more than half the body in length; dusky to black; III longest, twice VII, which is only about one and one half times VI. Head blackish. Eyes black. Neck and prothorax green, the latter with very small lateral tubercles. Thorax black. Wings with very slender brownish veins; cubitus obsolete at base; second branch nearer to apex of wing than to first branch. Stigma rather short and broad, dusky, obtuse at outer end. Legs all black but bases of femora. Abdomen green, with impressed marginal dots and the general color of the margins of a darker green. Honey tubes short, about the length of the tarsi, black. Tail nearly as long as the honey tubes, dusky, black. Length of body 1.50 mm., to tip of wings 2.95 mm.

This species has the seventh joint of the antennae the shortest of any with which I am acquainted. On upper part of stem, leaves and flower stalks of *Senecio canus*. War Bonnet Canyon, June 20, 1890. It is so plentiful at times as to cover nearly the entire plant.

Cotypes in the collection of the University of Nebraska (no. 88) and of the U. S. National Museum (no. 110).

71. **Aphis setariae** (Thomas).

Thomas, Bull. Ill. Lab. Nat. Hist., 2, p. 5 (1878). *Siphonophora setariae.*

Thomas, Ins. Ill., 8th Rep., pp. 56, 192 (1879). *Siphonophora setariae.*

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Monell, Bull. U. S. Geol. Sur. Ter., V, 1, p. 23 (1879). *Aphis setariae.* Oestlund, Syn. Aph. Minn., p. 67 (1887). *Aphis setariae.*

Apterous viviparous female: Subglobose. General color brownish red. Antennae on inconspicuous tubercles, reaching to base of honey tubes; I, II, tips of IV and V and all of VI and VII brown; VII longest. Eyes dark red. Legs yellowish, with dusky femoral and tibial tips and tarsi. Honey tubes tapering, dusky to black, 0.36 mm. long. Tail short, slender, pale.

Pupa: Elongate. Head brown. Antennae similar in color but less than half the body in length. Wing-pads brownish. Honey tubes similar but shorter. Tail not noticeable.

Winged viviparous female: Antennae at least as long as the body, on inconspicuous frontal tubercles; III–V with sensoria; VII one and one half to two times as long as III. Thorax dull black. Prothorax with lateral tubercles. Legs pale, with black joints and tarsi. Wings hyaline; discoidals equidistant at base; second branch of cubital arising much nearer the apex of wing than to first branch; stigma acute, dusky. Abdomen pale to reddish brown. Honey tubes dusky to black, 0.20–0.30 mm. long. Tail pale, nearly as long as the honey tubes. Length of body about 1.35 mm., to tip of wings 3 mm.

On barnyard grass (*Panicum crus-galli*), foxtail (*Setaria glauca* and *S. viridis*), and many other grasses. Ashland, Lincoln, Weeping Water.

Specimens in the collection of the University of Nebraska (nos. 89, 90) and of the U. S. National Museum (no. 114).

72. **Aphis solidaginifoliae** n. sp.

Apterous oviparous female: When young they are of a bright reddish brown color, with eight longitudinal rows of impressed dots on the dorsum. The mature individuals are dark red-brown, with transverse bands of blackish brown on each segment of the body; these are paler on the prothoracic segments. A row of impressed dots extends along each side of the body from the head to the tail. Head brown. Eyes black. Antennae with no frontal tubercles; tips of the joints black; VII longest and imbricated; III–V with a few scattered sensoria, and each with several stiff spreading hairs; all the joints irregular in shape. Beak hardly reaching the middle coxae. Legs very short, reddish, with tips of tibiae and tarsi dusky. Coxae brown. Honey tubes short (0.10 mm.), black. Tail short, conical, black. Anal plates blackish brown. Whole insect more or less covered with long, spreading hairs. Outline elongate oval, rather drawn out at each end. Length of body 2 mm.

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Found on *Solidago canadensis.* Ashland, September 20, 1890. It works on the upper side of the leaves, along the midrib and causes a downward swelling of the central portion of the leaf and a corresponding upward curling of the margins, so that the lice are completely surrounded. They are preyed upon by the larva of a small syrphid fly, which gets within the gall and soon destroys its occupants. Two or three individuals were found which I think were males, but a dissection was necessary to determine that conclusively, but I was unable to do so, owing to circumstances that made it impossible. They differed but little from the females. In many of the galls eggs of a greenish yellow color were found quite plentiful. The aphids were watched for some time but neither pupae or winged forms could be found. The general appearance of the louse is similar to *S. amygdali* (Fouse), but it differs in honey tubes, antennae and tail and in lacking the large marginal spots found in all the forms of that species.

Cotypes in the collection of the University of Nebraska (nos. 91, 92) and of the U. S. National Museum (no. 111).

73. **Aphis symphoricarpi** Thomas.

Thomas, Bull. Ill. St. Lab. Nat. Hist., 2, p. 12, 1878, and Ins. Ill., 8th Rep., p. 99 (1879 (in part)).

Oestlund, Syn. Aph. Minn., p. 50 (1887).

Apterous viviparous female: Green; the stem-mother is generally somewhat brownish. Head brownish. Eyes red. Antennae about two thirds as long as the body, minutely annulate; I and II brown; III, IV and V whitish except the tips, which together with VI are black; VII pale, as long as III. Legs pale, with dusky femoral and tibial tips and tarsi. Honey tubes dark, shorter than the hind tarsi. Tail nearly as long as the honey tubes, yellowish. The stem-mother is broadly oval in outline and 2.80 mm. long.

Pupa: Pale green, smaller than the apterous females. Wing-pads pale greenish.

Winged viviparous female: Head and thorax black. Antennae not as long as the body; III–V with sensoria; VII longer than III. Eyes dark brown. Wings with yellow insertions, heavy straight subcostal, prominent blackish oblique veins and broad stigma. Second branch of cubital arising nearer the base of the first branch than to the apex of the wing. Abdomen green, with black marginal spots and more or less broken, transverse bands on the dorsum. Legs black, with base of femora and sometimes a

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portion of tibiae paler. Honey tubes black, cylindrical, about equaling the tarsi in length. Tail very short, conical, hairy, greenish yellow. Length of body 2–2.30 mm., to tip of wings 3.50–3.80 mm.

On under side of leaves of snowberry (*Syphoricarpus racemosus* var. *pauciflorus*) and Indian currant (*S. vulgaris*), causing them to curl up and die. Generally most plentiful at the upper ends of the branches. Often a whole clump of the bushes are to be seen with the leaves twisted all out of shape by this species and *A. albipes* Oest. Ashland, May, 1890; Elmwood, June; War Bonnet Canyon, June, 1890.

Specimens in the collection of the University of Nebraska (no. 93) and of the U. S. National Museum (nos. 315, 329).

74. **Aphis vernoniae** Thomas.

Thomas, Bull. St. Lab. Nat. Hist., No. 2, p. 10 (1878).
Thomas, Ins. Ill., 8th Rep., p. 97 (1879).
Monell, Bull. U. S. Geol. Sur. Ter., V, No. 1, p. 23 (1879).

Apterous viviparous female: Color from green to yellowish. Antennae light colored or brownish, only about one third the body in length. Eyes black, rather large and prominent. Beak reaching to hind coxae. Honey tubes pale, cylindrical, twice the size of the obtuse club-shaped tail and longer than the tarsi. Tail yellowish. Legs pale, with dusky joints and tarsi. Abdomen large and broad for the size of the insect.

Winged viviparous female: General color yellow. Head and thoracic lobes dusky. Antennae pale to dusky, about two thirds the body in length; IV, V and VI subequal. Eyes black. Abdomen all yellow. Honey tubes yellowish, as in the apterous form, but longer. Tail pale or yellowish. Legs as in apterous. There is one form with black thoracic lobes and more or less of green on the abdomen.

On leaves and flower stalks of ironweed (*Vernonia fasciculata*). Lincoln, October 8, 1888; Weeping Water, October 10, 1888, and Ashland, October 2, 1889.

Specimens in the collection of the University of Nebraska (no. 94).

75. **Aphis viburni** Scopoli.

Scopoli, Ent. Carn. (1763).
Kaltenbach, Mon. Pflan., p. 78 (1843).
Koch, Die Pflan., p. 122, figs. 165, 166 (1854).
Buckton, Mon. Brit. Aph., II, p. 77, pl. LXI (1879).
Thomas, Ins. Ill., 8th Rep., p. 96 (1879).

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Apterous viviparous female: Green to olive green, pulverulent. Antennae very short, only about one fourth the body in length, the three apical joints blackish. Beak reaching almost to hind coxae, black tipped. Legs pale green, except tarsi and tarsal end of tibiae, which are blackish. Honey tubes rather short, blackish. Tail not noticeable, but the abdomen prolonged into a conical tip. Later in the season the apterous forms have but 6-jointed antennae.

Pupa: Oblong, very pulverulent. Head brownish. Wing-pads pale greenish.

Winged viviparous female: Head and thorax black. Beak reaching hind coxae. Eyes black. Antennae about two thirds as long as the body; shining black; III–V unusually robust, with sensoria, III and IV very thickly covered with them; VII filiform, much longer than III. Prothorax brown, with lateral tubercles. Wings with very large brown stigma and slender, oblique veins. Legs shining black except the immediate bases of the femora. Abdomen greenish brown, with black marginal spots and transverse bands and often a large dorsal spot. Honey tubes black, 0.30 mm. Tail acutely conical, short and hairy, brown. Anal plates blackish. Beneath with sternum and coxae blackish. Length of body 2.65 mm., to tip of wings 4.40 mm.

On snowball (*Viburnum opulus* var. *roseus*). Ashland. On April 27 the viviparous female was found and upon visiting the place the last of May no lice of any kind could be found. In September and October they again appeared. It was at this time that the 6-jointed forms were found. Joint II divides and forms III and IV of the winged form. This same variation was noticed in the plum aphis this year.

Specimens in the collection of the University of Nebraska (nos. 95, 96) and of the U. S. National Museum (nos. 317, 318).

76. **Aphis yuccicola** n. sp.

Apterous form: Green. Antennae but little more than half the body in length, pale at base, dusky to black toward the tip. Head small. Abdomen green, with transverse bands and marginal dots. Honey tubes and tail black. Legs pale with dusky joints and tarsi. Beak reaching to or beyond the third pair of coxae.

Pupa: Similar to the apterous form in color, but with head larger, honey tubes and tail shorter and size smaller. Wing-pads black.

Winged form: Antennae but little more than half the body in length, black, pale at base; III longest. Head black. Eyes dark red. Neck green. Prothorax dark green to brown, with lateral tubercles. Thorax black. Wings with broad rounded tips, slender brownish veins; second

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discoidal curved gradually for nearly its entire length; cubitus obsolete at base, second branch nearer the apex of the wing than to the first branch. Stigma dusky brown, rather narrowly lanceolate, acute at both ends. Stigmal vein with the last third nearly straight, the first two thirds rather sharply curved. Abdomen green, with black marginal dots, a green transverse band between and in front of the honey tubes, and darker bands behind them. Honey tubes and tail black, the former 0.27 mm. long, the latter about one third as long, club-shaped. Length of body about 1.73 mm., to tip of wings 3.25 mm.

Found on the flower stalks of *Yucca angustifolia,* in very large colonies, in both Sioux and Dawes counties, June to July, 1890.

Cotypes in the collection of the University of Nebraska (nos. 97, 98, 99) and of the U. S. National Museum (no. 319).

Genus **Siphocoryne**

77. **Siphocoryne pastinaceae** (Linnaeus).

Linnaeus, Syst. Nat., I, 2, p. 734 (1767). *Aphis pastinaceae.*
Fabricius, Ent. Syst., IV, p. 213 (1794). *Aphis pastinaceae.*
Koch, Die Pflan., p. 41, figs. 52–54 (1854). *Rhopalosiphum pastinaceae.*
Passerini, Gli afidi. (1860). *Siphocoryne pastinaceae.*
Thomas, Ins. Ill., 8th Rep., p. 84 (in part) (1879). *Siphocoryne pastinaceae.*
Buckton, Mon. Brit. Aph., II, p. 24, pl. XLIII, figs. 5–7 (1879). *Siphocoryne pastinaceae.*
Oestlund, List Aph. Minn., p. 36, 1886, Syn. Aph. Minn., p. 70 (1887). *Siphocoryne archangelicae.*

Apterous viviparous female: Color yellowish green, except the tarsi and tips of antennae, which are dusky. Eyes very dark red. Honey tubes clavate, reaching beyond the tip of abdomen. Tail medium sized; both honey tubes and tail green.

Winged viviparous female: General color yellowish green. Head and lobes of thorax black. Antennae black, paler at base; generally a little more than half as long as the body; VII about two thirds III, the latter very conspicuously tuberculate. Beak hardly reaching middle coxae. Prothorax greenish brown with an anterior black stripe. Legs yellowish to dusky, with darker tips and blackish tibiae. Abdomen yellowish green, with a large dorsal spot and marginal dots of dark brown. Honey tubes reaching to or beyond the tip of the abdomen, brown, clavate. Tail dusky, or in some specimens greenish, medium sized. Wing insertions yellowish; subcostal and stigma conspicuous, dusky. Stigmal vein rather sharply and evenly curved. Length of body about 2.25 mm., to tip of wings about 4.20 mm.

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On flower umbels of bull parsnip. War Bonnet Canyon, June 21, 1890. My specimens are a link between *S. pastinaceae* of Buckton and *S. archangelicae* Oestlund. I think the latter is but a variety of the former, the only differences that I can make out being a slight variation in color and IV being tuberculate in Oestlund's specimen.

Specimens in the collection of the University of Nebraska (nos. 100, 101) and of the U. S. National Museum (no. 80).

Tribe **NECTAROPHORINI**

Genus **Myzus**

78. **Myzus achyrantes** (Monell).

Monell, Bull. U. S. Geol. Sur. Ter., V, 1, p. 18 (1879). *Siphonophora achyrantes.*

Thomas, Ins. Ill., 8th Rep., p. 187 (1879). *Siphonophora achyrantes.*

Oestlund, List Aph. Minn., p. 31 (1886). *Myzus malvae.*

Oestlund, Syn. Aph. Minn., p. 74 (1887). *Myzus achyrantes.*

Apterous viviparous female: Pale green, with a dark, irregular stripe on each side of abdomen; in fully developed specimens occasionally with an additional stripe near the basal part of the abdomen, extending over several segments.

Winged viviparous female: Head, prothorax and sometimes the upper segments of the abdomen brownish black; the upper part of the thorax with a narrow but conspicuous, transverse yellow band; general color of abdomen pale green, with irregular, broken, transverse, dark brown lines, three of these often becoming confluent and producing a large dark patch in the center of the abdomen just above the honey tubes. Honey tubes long, cylindrical, slightly dusky at their apices. Tail long, slender, slightly curved upward, more or less dusky. Length of antennae a little variable, as long as the body or slightly longer. Frontal tubercles approximate at base and somewhat porrect. Wings hyaline; stigma rather narrow and linear; stigmal vein very short and curved much as in the genus *Callipterus.* The forklets of the cubitus are especially variable, their length being in one case four times and in another one half that portion of the cubitus between the base of the lower branch and the base of the forklets. In the normal specimens these distances are subequal. Length of body 2.28 mm., to tip of wings 3.81 mm. (Monell).

On common amaranth (*Amaranthus* sp.). Ashland, June 20, 1890. Only the apterous form was found, but I am sure it is

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this species. It belongs to *Myzus,* as is shown by the porrect tubercles.

79. **Myzus cerasi** (Fabricius).

On cultivated plum, Lincoln, May 17, 1889, specimen no. 102, University of Nebraska collection.

80. **Myzus oenotherae** n. sp.

Apterous form: General color pea green. Antennae as long as or longer than the body, pale, tips of III and IV, outer half of V and VI and VII black; VII rather longer than III; I and tubercle gibbous on the inner side. Eyes red. Legs yellowish green, hairy, tarsi and lower end of tibiae blackish. Honey tubes long, slender, dusky at tip, reaching beyond the tip of abdomen. Tail concolorous with abdomen, rather more than half the honey tubes in length, rather acute, curved upwards, hairy.

Pupa: Similar to apterous form but with shorter antennae; VII longest; tail shorter; legs paler, and body more elongate.

Winged female: General color as in apterous form. Head and thorax with a pinkish tinge. Antennae more slender, paler; III with a single row of sensoria; VII minutely annulate. Eyes very dark red or black. Beak reaching midway between second and third pair of coxae. Wings with yellowish insertions, rather heavy, punctate, with moderately heavy veins; second branch of cubitus beginning somewhat nearer the first branch than to the apex of the wing. Stigma yellowish white. Stigmal vein sharply curved for at least two thirds its length. Legs yellowish green, with dusky joints and tarsi. Honey tubes and tail as in apterous except that the former are minutely annulated. Length of body about 2 mm.

Winged male: Smaller than female; antennae darker; I, II and base of III pale, all the remainder black; wings clearer and more delicate; legs generally darker. Length of body about 1.80 mm.

All forms more or less covered with capitate hairs. Antennal tubercles not so conspicuously gibbous in the winged forms as in the apterous form or pupae. This is one of the species of *Myzus* that shows a decided connection between that genus and *Siphonophora* and makes it doubtful if the former should be separated from the latter. This species is similar in general appearance to *M. potentillae.* It is, however, a much larger insect and differs from that species in many other respects, as will be seen in the description.

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On stem and leaves of *Oenothera biennis.* Ashland, May 25 and 30, 1890. It causes the leaves to curl up somewhat.

Cotypes in the collection of the University of Nebraska (nos. 103, 104) and of the U. S. National Museum (nos. 134, 397).

81. **Myzus plantagineus** Passerini.

Passerini, Gli afidi, p. 35 (1860).

Apterous viviparous female: Pale green, somewhat pulverulent. Antennae pale, nearly or quite as long as the body, on very prominent swollen tubercles; first joint conspicuously gibbous, apical joints dusky. Legs pale. Honey tubes reaching to tip of abdomen, very slender, green.

Winged viviparous female: General color green. Antennae as in apterous form but dusky to black, with paler base. Head and thorax black. Prothorax green. Eyes very dark red. Wings with robust black veins, narrowly bordered with smoky brown. Second branch of cubitus rather nearer to the apex of the wing than to the first branch. Stigma rather narrow, acute at outer end, dusky. Hind wings with robust, smoky black veins. Abdomen pale green, without any darker markings, except in a few specimens a darker green spot at the base of each honey tube. Honey tubes concolorous with the abdomen, slightly swollen at the tips, 0.32 mm. long. Tail concolorous with abdomen, 0.08 mm. in length. Legs pale, with dusky to black joints and tarsi. Length of body 1.45 mm., to tip of wings 2.70 mm.

On the under side of leaves and on the petioles of common plantain (*Plantago major*) near the ground. Fremont, July 31, 1890. What is probably the same thing was taken, feeding on the roots of the same plant, at Ashland, April 21, 1890.

Specimens in the collection of the University of Nebraska (nos. 105, 106) and of the U. S. National Museum (no. 135).

82. **Myzus potentillae** n. sp.

Apterous form: General color clear pea green; oval in outline. Eyes red. Antennae brownish black, paler at the base; longer than the body, on distinct, swollen tubercles. First joint swollen on inner side, III and IV tuberculate, VII longer than III. Legs pale brownish, tarsi brown to black. Honey tubes green, becoming brownish, not reaching to tip of abdomen, hardly twice the tarsi. Tail short, obtuse, hairy. The entire body covered with long capitate hairs.

Pupa: Similar in color to apterous form; body more elongate; wing-pads pale yellowish green.

Winged female: Color and eyes as in apterous form but thorax olive tinged. Antennae as in apterous form or darker; III, IV and V tuber-

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culate; VI very short. Legs brownish, with yellowish bases. Tarsi blackish. Wings with rather heavy blackish veins, the three oblique veins originating equidistant; first and second discoidals only slightly if at all curved; cubitus often with but one branch. Stigma lanceolate, acute at both ends, dirty white. Stigmal vein prominent, sharply curved. Honey tubes rimmed at the tip, dusky, greenish at base, not reaching to tip of abdomen, about twice the tarsi. Tail short, knobbed, hairy. Length of body about 1.90 mm., to tip of wings about 3.25 mm.

All forms are more or less covered with capitate hairs, the winged form having them on the head and antennae principally. Oestlund describes a species on *Potentilla anserina* under this name but afterwards concludes that it is *Myzus rosarum.* My specimens are very different from that species and produce quite a different effect on the plant.

On *Potentilla arguta.* Ashland, May 24, 1890. On the under side of the leaves, causing them to curl up.

Cotypes in the collection of the University of Nebraska (nos. 107, 108) and of the U. S. National Museum (no. 376).

83. **Myzus ribis** (Linnaeus).

Linnaeus, Syst. Nat., II, p. 733 (1767). *Aphis ribis.*
Kaltenbach, Mon. Pflan., p. 39 (1843). *Aphis ribis.*
Fitch, Trans. N. Y. Ag. Soc., XIII, p. 435 (1856). *Aphis ribis.*
Koch, Die Pflan., p. 39, figs. 50, 51 (1854). *Rhopalosiphum ribis.*
Passerini, Gli afidi, p. 31 (1860). *Myzus ribis.*
Buckton, Mon. Brit. Aph., I, p. 180, pl. XXXIV, figs. 1–4 (1876). *Myzus ribis.*
Thomas, Ins. Ill., 8th Rep., p. 76 (1879). *Myzus ribis.*
Oestlund, Syn. Aph. Minn., p. 74 (1887). *Myzus ribis.*
Weed, Psyche, V, p. 210 (1889). *Myzus ribis.*

Apterous viviparous female: Elongate oval. Color yellowish green, more or less mottled with dark green. Antennae thread-like, as long as or longer than the body, on gibbous frontal tubercles and I gibbous, pale; whole body more or less covered with whitish, capitate hairs or bristles. Front very bristly. Legs pale, with dusky tarsi. Honey tubes slender, 0.50 mm. long, often slightly clavate, pale. Tail short and conical, hairy, pale.

Winged viviparous female: Head and thorax olive brown to black. Antennae longer than the body, black; III and IV with sensoria; VII much the longest. Beak rather long. Wings large, with yellowish insertions; veins dusky yellowish; stigma dirty white. Legs pale, with dusky joints and tarsi. Abdomen with more or less distinct marginal spots and trans-

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verse bands of brown. Honey tubes much as in apterous female, but sometimes slightly dusky. Tail similar, about one third as long as the honey tubes. Length of body 2–2.50 mm., to tip of wings 3.75–4 mm.

"Winged male: Antennae, head, band on prothorax, row of dots on each side of dorsum of abdomen and transverse patch back of middle of same, black. Legs very long, with coxae, apical half of femora and apical fourth of tibiae, together with tarsi, black, the rest yellow. Honey tubes long, slender, slightly incrassate. Antennae about one third longer than body, slender, roughened with numerous sensoria; I large, thickened, about as long as II; III longer than any except VII; IV and V subequal; VI shorter than V; VII very long and slender. Tail minutely tuberculate, with several curved, stiff hairs arising from the margin. Length of body 2 mm., antennae 2.70 mm., honey tubes 0.50 mm., wing expanse 8.50 mm."

"Oviparous female: Body globose; greenish, shade varying with age of specimen. Antennae pale at base but blackish apically and at articulations. Legs pale, articulations and tarsi dusky; the thickened posterior tibiae greenish brown. Antennae short, less than half the length of the body; 6-jointed; I and II short, subequal; III and VI subequal; both longer than any of the others; IV and V subequal, about one third shorter than III; III–VI strongly tuberculate, having numerous sensoria. Tail long and large, spinosely tuberculate, with several long curved hairs arising from its dorsal surface. Beak reaching posterior margin of middle coxae. Length of body 0.75–1 mm." (Weed).

On under side of leaves of gooseberry and currant (*Ribes* sp.), causing them to blister and turn reddish. A very common species and frequently so thick as to cause considerable damage, as was the case during the season of 1889. Lincoln, Ashland, Weeping Water, Pine Ridge, War Bonnet Canyon.

There are several varieties in the state. The specimens from Pine Ridge are much more bristly than usual and of a much paler color, many having scarcely any darker markings on the dorsum. The Lincoln specimens have the honey tubes more than ordinarily clavate, but do not differ much in color from the typical form. Some forms have considerable amount of capitate hairs on the winged individuals, while others have very few or none of them.

Specimens in the collection of the University of Nebraska (nos. 109, 110) and of the U. S. National Museum (nos. 136, 137).

84. **Myzus rosarum** (Walker).

Walker. *Aphis rosarum.*

Koch, Die Pflan., p. 180, figs. 247, 248 (1854). *Siphonophora rosarum.*

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Buckton, Mon. Brit. Aph., I, p. 150, pl. XXII (bis) (1876). *Siphonophora rosarum.*

Oestlund, List Aph. Minn., p. 30 (1886). *Myzus potentillae.*

Oestlund, Syn. Aph. Minn., p. 73 (1887). *Myzus rosarum.*

Apterous viviparous female: Elongate oval. Bright green. Antennae and legs rather short. Frontal tubercles gibbous; of medium size. Dorsum more or less tuberculate and with capitate hairs arising from the tubercles. Front with a tuft of large capitate hairs. Eyes reddish brown. Segments of the abdomen plainly distinguished. Honey tubes slightly swollen near the tips. Tail short, green.

Winged viviparous female: General color green. The bristles of the apterous form wanting. Head and thoracic lobes black. Antennae about as long as the body; III longest, blackish. Beak reaching middle coxae. Wings rounded, with smoky black veins, which have narrow smoky margins expanding at the apices of the veins. Legs black, with base of femora and upper portion of tibiae yellowish. Abdomen green, with blackish marginal spots and transverse bands. Honey tubes green, sometimes dusky, cylindrical, about three times as long as the tarsi. Tail short, acute, pale green. Length of body about 2 mm.

On roses in greenhouses and in the fields. Ashland, Lincoln, Weeping Water, Omaha. I have found a form with the capitate hairs almost entirely absent.

Specimens in the collection of the U. S. National Museum (no. 138).

85. **Myzus thalictri** n. sp.

Apterous viviparous female: Clear green, with dusky legs and a large dark green spot at the base of each honey tube, the latter dusky.

Pupa: Rather paler green than the apterous form; more elongate in shape; wing-pads dusky. Antennae in both forms rather shorter than the body.

Winged viviparous female: Green. Antennae as long as the body, dusky to black. Head dusky. Eyes dark red. Neck and prothorax green. Thorax dusky to black. Wings with rather robust brownish veins; discoidals rather straight; first branch of cubital forming an almost straight line with the upper part of the vein; second branch nearer to the apex of the wing than to the first branch. Stigma yellowish. Stigmal vein sharply curved its entire length. Subcostal very heavy, smoky. Abdomen green, darker in the vicinity of the honey tubes. Legs dusky or sometimes pale, with only joints and tarsi dusky. Honey tubes black, 0.62 mm. long.

Winged male?: Smaller than female. Greenish yellow. Head larger, antennae longer, tail shorter and whole body slenderer than in the female. Abdomen with sides nearly straight and an irregular dark green band ex-

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tending across between the honey tubes. Honey tubes slenderer and somewhat shorter than in female.

Length of female 1.90 to 2.25 mm., to tip of wing 3.50 to 3.95 mm. Length of male 1.40 to 1.50 mm., to tip of wing 3.30 mm.

On the upper branches, petioles, leaves and flower stalks of *Thalictrum polygamum.* Ashland, June 11. On *Thalictrum* sp., War Bonnet Canyon, June 21, 1890. Causes the leaves to become somewhat deformed.

Cotypes in the collection of the University of Nebraska (nos. 111, 112) and of the U .S. National Museum (nos. 139, 140).

Genus **Rhopalosiphum**

86. **Rhopalosiphum dianthi** (Schrank).

Schrank, Fn. Boi., II, p. 114 (1801). *Aphis dianthi.*
Kaltenbach, Mon. Pflan., p. 42 (1843). *Aphis dianthi.*
Koch, Die Pflan., p. 42, figs. 55, 56 (1854). *Rhopalosiphum dianthi.*
Buckton, Mon. Brit. Aph., Vol. II, p. 15 (1879). *Rhopalosiphum dianthi.*
Thomas, Ins. Ill., 8th Rep., p. 80 (1879). *Rhopalosiphum dianthi.*
Oestlund, Syn. Aph. Minn., p. 76 (1887); List Aph. Minn., p. 34 (1886). *R. sonchi.*

Apterous viviparous female: Color shining green, ochreous yellow or brownish yellow. Skin finely punctured, ovate. Pointed towards the apex. Head broad. Antennae shorter than the body, on rather large frontal tubercles. Honey tubes green, with black tips. Tail green, about one third the honey tubes in length. Abdomen convex, and being transparent, often seen mottled with yellow young embryos. The color is, however, exceedingly variable. In autumn it is often of an ochreous red and deeply furrowed and wrinkled.

Pupa: Much like the larva. Wing cases tipped with brown, points of antennae brown.

Winged viviparous female: Head, thorax and band on prothorax black. Abdomen shining reddish yellow, with a broad black dorsal spot, several dark lines and marginal row of black dots. Legs ochreous. Antennae black, as also are the femora, the tibial points and tarsi. Honey tubes brown. Wing insertions and subcostal yellow. Stigma gray. Rostrum reaches the second coxae. The winged form appears of various colors, such as green, ochreous and even black (Buckton).

Length of body about 2 mm. The apterous form is generally smaller.

Common on carnation pinks and various other house plants found at all times of the year in the conservatories. Ashland, Weeping Water, Lincoln, West Point.

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Specimens in the collection of the University of Nebraska (nos. 113, 116) and of the U. S. National Museum (nos. 25, 29).

87. **Rhopalosiphum dianthi** var. **poae** n. var.

This differs from the preceding in the pupa having dusky wing-pads and legs, and the winged form having III and IV of the antennae covered with many roundish sensoria, the abdomen with few darker markings, legs darker and tail very short (0.10 to 0.15 mm.) and acutely conical. The insect is somewhat smaller.

This may be distinct enough to deserve specific rank, but I have never seen winged specimens of *R. dianthi,* so am loath to put it as such till I have a better understanding of that species at least. This form is at least deserving of varietal rank.

On lower leaves and stems of bluegrass (*Poa* sp.?), in the greenhouse at the University of Nebraska, February 1, 1890.

Cotypes in the collection of the University of Nebraska (no. 119) and of the U. S. National Museum (no. 26).

88. **Rhopalosiphum nymphaeae** (Linnaeus).

Linnaeus, Syst. Nat., I, 2, p. 734 (1767). *Aphis nymphaeae.*
Fabricius, Ent. Syst., IV, p. 214 (1794). *Aphis nymphaeae.*
Schrank, Fn. Boi., II, p. 117 (1801). *Aphis nymphaeae.*
Kaltenbach, Mon. Pflan., p. 104 (1843). *Aphis nymphaeae.*
Koch, Die Pflan., pp. 26, 44, figs. 33, 34, 35, 57. *Rhopalosiphum nymphaeae.*
Koch, *l. c.*, p. 45, fig. 58 (1854). *R. najadum.*
Buckton, Mon. Brit. Aph., II, p. 12, pl. XLI, figs. 1–3 (1879). *R. nymphaeae.*

Apterous viviparous female: Broadly oval; dark olive green variously mottled with lighter green. Some specimens are quite glaucous, while others are smooth and shining. Antennae, legs, honey tubes, anal plates and tail black. Antennae about half the body in length. Beak reaching to hind coxae. Eyes dark reddish brown. Honey tubes clavate. Tail short and acute.

Pupa: Smaller; wing-pads blackish; honey tubes shorter; tail short and conical; otherwise as in the female.

Winged viviparous female: Head, thorax and antennae black, the latter on moderately sized tubercles, minutely annulate. Prothorax brown. Abdomen olive green, with three or four black marginal spots and various darker markings along the dorsum. In some specimens the darker markings are almost entirely wanting, while in others they are very prominent.

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Legs as in apterous form or sometimes with base of femora and part of tibiae yellowish. Wings with yellowish insertions and subcostal; stigma conspicuous, brown; oblique veins heavy and blackish. Honey tubes and tail as in the apterous female. Length of body 2.50 mm., to tip of wings 4.10 mm.

One of our commonest aphids. Found on *Potamogeton, Sagittaria, Ammania, Bidens, Alisma, Juncus, Naias, Typha, Nelumbo, Nymphaea, Lemna* and many other plants growing along the water's edge; generally most plentiful from July to September. Ashland, Lincoln, Weeping Water, Fremont. One of the most variable species with which I am acquainted, both with respect to size and coloration.

Specimens in the collection of the University of Nebraska (nos. 120–124) and of the U. S. National Museum (nos. 30, 31, 32).

89. **Rhopalosiphum rhois** Monell.

Monell, Bull. U. S. Geol. Sur. Ter., V, 1, p. 27 (1879).
Oestlund, Syn. Aph. Minn., p. 75 (1887).

Apterous viviparous female: General color reddish brown (in some individuals this becomes more or less of a dark green). Antennae black, with paler base. Eyes black. Beak short. Honey tubes 3–4 times the tarsi, dusky to blackish, clavate. Tail slender, same color as abdomen. Legs yellowish brown, with dusky tarsi.

Pupa: Lighter colored, often quite green. Wing-pads pale greenish. Tail very short and conical. Size smaller than the apterous female.

Winged viviparous female: Head and thoracic lobes black; rest of body varying from brown to olive green. Antennae black, a little longer than the body, on inconspicuous frontal tubercles; III and VII subequal in length, either longer than V and VI together. Wings slender, with blackish oblique veins. Legs, honey tubes and tail much as in the apterous female. The honey tubes rather longer and more clavate. Tail about one third the honey tubes in length. Length of body about 1.90 mm., to tip of wings 3.80 mm.

On under side of leaves of sumach (*Rhus glabra*). Lincoln, September, 1888; West Point, July, 1890. It varies considerably in coloration; is generally found in large companies along the midrib of the leaves.

Specimens in the collection of the University of Nebraska (no. 125) and of the U. S. National Museum (no. 24).

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Genus **Amphorophora**

90. **Amphorophora ampullata** Buckton?

Buckton, Mon. Brit. Aph., I, p. 187, pl. XXXVII, fig. 4 (1876).

Oestlund, Syn. Aph. Minn., p. 77 (1887). *Rhopalosiphum ampullata.*

Apterous viviparous female: Bright green, often with the color deepening on the dorsum and along the sides of the abdomen. Antennae very long, nearly or quite twice the length of the body, on very large frontal tubercles; pale, with the articulations blackish. Eyes dark red. Legs greenish, with tibial tips and tarsi black, rather large and long. Honey tubes reaching beyond the tip of the abdomen; green, with black tips; very much dilated in the middle. Tail hardly one third as long as the honey tubes, yellowish, upcurved. The young can be seen very plainly within the parent insect. Length of body about 3.10 mm.

On under side of leaves of an undetermined rosaceous plant. Ashland, October, 1889; quite common. I do not think that this species can be placed in the genus *Rhopalosiphum,* as is done by Oestlund. It differs from the typical members of that genus in too many particulars.

Genus **Siphonophora**

91. **Siphonophora ambrosiae** Thomas.

Thomas, Bull. Ill. St. Lab. Nat. Hist., No. 2, p. 4 (1878).

Thomas, Ins. Ill., 8th Rep., p. 50 (1879).

Oestlund, Syn. Aph. Minn., p. 84 (1887).

Apterous viviparous female: Color dull reddish brown. Elongate oval. Antennae longer than the body, on large, conspicuous tubercles; I dark brown, II and base of III pale, remaining joints black; VII longer than III; hairy. Eyes dark red. Beak reaching hind coxae. Legs yellowish, with femoral and tibial tips and tarsi black. Abdomen with dorsum tubercled. Honey tubes black, reaching beyond tip of abdomen, 0.90 mm. long. Tail two thirds of the honey tubes in length, yellowish, upcurved, acute.

Pupa: Similar to the female, but with limbs generally shorter. Wing-pads dusky black.

Winged viviparous female: General color dark seal brown, shining. Antennae slightly longer than body, pale at base, rest black, with capitate hairs; VII longest. Abdomen without the tubercles of the apterous female. Wings with the discoidals much curved. Legs blackish except base of femora, long. Beak, honey tubes and tail much as in the apterous form, but generally a little shorter. Length of body about 2.75 mm., to tip of wings 4.75 mm.

On *Ambrosia trifida,* during the seasons of 1888–90; very common. Weeping Water, Ashland, Lincoln.

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Specimens in the collection of the U. S. National Museum (nos. 3, 381).

92. **Siphonophora artemisicola** n. sp.

Apterous form: General color of body pale green, the entire body covered with white capitate hairs, giving the insect a very pulverulent appearance and a color similar to the plant upon which it feeds. Some specimens have a row of marginal dots but these are lacking in many. All have a light brownish green medial line when first collected, which disappears when the insect is mounted in balsam. Antennae about as long as the body, but varying; VII longest; I dusky; II, III and lower part of IV paler, remaining joints black. Legs black, with upper part of femora and middle part of tibiae paler. Honey tubes black, very slender, 0.45 to 0.50 mm. in length. Tail white, short, subconical, acute, about 0.15 mm. long. Length of body 1.70 to 1.90 mm.

A very active species, similar in some respects to *S. ludovicianae* Oest. It is easily distinguished by the white, capitate hairs, short tail and other minor points.

On upper part of stem and leaves of *Artemisia cana.* Squaw Canyon, June 24, 1890. What seems to be the same thing was taken on *Cnicus lanceolatus* at Brookings, S. D., July 11, 1891. In the Dakota specimens, however, the legs, antennae and honey tubes are pale, but the colors of the body, the slender honey tubes and the abundance of capitate hairs serve to distinguish the species.

Cotypes in the collection of the University of Nebraska (no. 126) and of the U. S. National Museum (no. 4).

93. **Siphonophora carnosa** Buckton.

Buckton, Mon. Brit. Aph., Vol. I, p. 144, pl. XX (1876).

Apterous viviparous female: Large. Dark ginger brown, lilac, flesh-color or gray. Hoary, punctured, much corrugated, particularly near the carina or connexivum. Head and thorax broad. Antennae and legs ginger brown and hairy. Depressions on the first and second thoracic rings. Carina much marked and wrinkled. Tail brown. Length of body 3.30 mm.

Pupa: Smaller than the larva. Most usually of a rosy pink, with greenish wing cases. Carina distinct. The hoary coat more pronounced than in the larva.

Winged viviparous female: Large. The imagos on emerging from the pupae are first of a delicate gray, afterwards they become green, warm reddish, ginger brown or flesh-color. All forms are hoary. The ocelli are

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distinctly marked. A dark patch behind the head. The thoracic lobes are somewhat linear in form and dark brown like the scutellum. Abdomen with a faint green dorsal stain and green patches at the base of the nectaries. Wings hyaline, with green insertions and brown cubitus and stigma. Other veins coarse and black. Cauda pointed and green. The young are very delicate in tint, shading off from white to flesh-color, to pink, and to yellow. They are often prettily spotted about the head with rose color. They run very fast and are much more active than the adult insects. Length of body 2.54 mm.

My insect does not quite agree with Buckton's description and feeds on a different plant. I think the difference is enough to justify a varietal name at least, and it may be known by the following one.

93. **Siphonophora carnosa** var. **impatientis** n. var.

This form differs from the species in the following respects:

Apterous viviparous female: As in the species but with tail pale.

Pupa: Similar to the species except that the wing pads are whitish.

Winged viviparous female: Differs in having no dark patch behind the head; thoracic lobes but very little if any darker than the remainder of the body, and the abdomen with no green markings. Honey tubes reaching to tip of abdomen, dusky to black.

On upper branches and leaves of wild touch-me-not (*Impatiens fulva* and *I. pallida*). Ashland, October 5, 1889; Wabash, August 22, 1890.

Cotypes in the collection of the University of Nebraska (nos. 127, 128, 129) and of the U. S. National Museum (no. 18).

94. **Siphonophora chrysanthemi** Oestlund.

Oestlund, List Aph. Minn., p. 22 (1886).

Oestlund, Syn. Aph. Minn., p. 84 (1887).

Apterous viviparous female: Color varying from dark brownish green to almost black. Antennae on medium sized frontal tubercles, about three fourths as long as the body, black, with III and base of IV paler; VII longest. Legs rather short, dusky yellow, with joints, tips and tarsi black. Dorsum with a few very small black tubercles. Honey tubes about 0.30 mm. long, black, imbricated. Tail yellowish, about half as long as the honey tubes.

Winged viviparous female: Head and thorax dark brown to black. General color dark brownish green to almost black. Prothorax with sides

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drawn out into an obtuse angle, and a black line on its front edge. Beak reaching middle coxae. Eyes dark red. Wings with yellowish insertions, subcostal and stigma, the latter rather long and pointed and angled at base of stigmal vein; oblique veins slender and brownish. Abdomen broad, with marginal spots of black. Honey tubes as in apterous female but rather slenderer and longer. Tail half as long as honey tubes, robust, upcurved, yellowish. Length of body 2.40 mm., to tip of wings 4 mm.

On bur marigold (*Bidens connata* and *B. chrysanthemoides*), generally along the upper leaves and flower stalks. Lincoln, Weeping Water, October, 1888; Ashland, October, 1890. Most of the winged individuals have the legs all black but base of femora. This species has much of the appearance of an *Aphis* but has the honey tubes and tail and frontal tubercles of *Siphonophora*. It is very close to several of the European species on Composites.

Specimens in the collection of the University of Nebraska (no. 130) and of the U. S. National Museum (nos. 9, 349).

95. **Siphonophora chrysanthemicolens** n. sp.

Apterous viviparous female: General color dark seal brown to a purplish black, often with a very distinct coppery tinge. Head, prothoracic segment, all the antennae but the basal two thirds of III, honey tubes, tail, anal plates, coxae, distal half of femora, both ends of tibiae and tarsi deep shining black. Basal two thirds of III dusky; proximal half of femora and middle portion of tibiae yellowish. Antennae about as long as the body, on distinct, medium sized frontal tubercles; III and VII subequal, the former with a few small circular sensoria, the latter minutely annulate. I and II very robust. Eyes black. Beak reaching to or beyond the hind coxae. Abdomen carinated. Honey tubes much larger at the base than at the tip, 0.44 mm. long. Tail as long as honey tubes, very robust, upcurved, hairy. The whole insect, especially its legs, head and the base of the antennae covered with long black hairs. Length of body about 2.40 mm.

On upper part of stem and leaves of chrysanthemum in greenhouse at Omaha, January 16, 1891. Lincoln, Brookings, S. D., Minneapolis. A small, well characterized species, having much the appearance of an *Aphis*, but the legs are long and the frontal tubercles and tail place it in Siphonophora. It is easily recognized by its shining black markings, large tail and rather short,

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robust honey tubes. The insects are very lively and drop quickly from the plants when disturbed.

Cotypes in the collection of the University of Nebraska (nos. 131, 132) and of the U. S. National Museum (nos. 7, 149).

96. **Siphonophora desmodii** n. sp.

Apterous form: General color yellowish green. Antennae longer than the body; I, II and III dusky, remaining joints black. Head very slightly dusky. Eyes red. Abdomen yellowish green. Legs very long, especially the hind pair; yellowish, joints and tarsi dusky to black. Honey tubes black, largest at base and tapering gradually to the tip, annulated. Tail concolorous with abdomen, as long as the honey tubes (0.35 mm.), acute.

Winged form: General color as in apterous form. Antennae longer than the body, black, or with I and II brown and III paler; VII longest, IV next, it being longer than III; II is also long in comparison to the rest. Head dusky. Eyes red. Neck and prothorax yellowish green. Thorax dusky, with yellowish green membrane. Wings with remarkably clear texture and heavy dark subcostals; first and second discoidals very straight and with smoky black margins, second discoidal starting equidistant from the first and third; cubital subobsolete at base, arising from the subcostal opposite the stigma, one sixth of the way from its inner end, the second branch very near the apex of the wing, or sometimes wanting entirely or represented by a thickening at the end of the first branch. Stigma dusky brown. Stigmal vein curved for the first half, then almost straight. Abdomen yellowish green, with brownish spots around the base of the honey tubes. These latter and the tail as in apterous form. Length of body 2.36 mm., to tip of wings 3.30 mm. This species is sparsely covered with capitate hairs which are thickest on the legs and antennae.

On under side of leaves and along the flower stalks of *Desmodium canescens.* West Point, July 29, 1890 (Bruner); Weeping Water, August 16, 1890. It causes the leaves to curl. A very pretty species having some characters not usually found in this genus, as the smoky borders to the veins; but I do not think this is sufficient reason for removing it from the genus, since all the other characters are those of *Siphonophora.*

Cotypes in the collection of the University of Nebraska (nos. 133, 134, 135) and of the U. S. National Museum (nos. 10, 11).

97. **Siphonophora erigeronensis** Thomas.

Thomas, Bull. Ill. St. Lab. Nat. Hist., No. 2, p. 7 (1878).
Thomas, Ins. Ill., 8th Rep., p. 58 (1879).
Oestlund, Syn. Aph. Minn., p. 82 (1887).

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Apterous viviparous female: Pale green. Antennae on large frontal tubercles; I, II and base of III pale, remainder black; III and VII subequal in length. Eyes black. Beak reaching to hind coxae. Legs long, with joints and tarsi blackish. Abdomen clear green. Honey tubes long (0.96 mm.), curved, imbricated, dusky to black. Tail yellowish green, not half the length of the honey tubes, hairy, acute.

Winged viviparous female: General color as in apterous form. Head and thorax of a darker, shining green. Antennae with more black than in apterous, III with numerous very small, scattered sensoria, otherwise similar. Beak as above. Legs black except the bases of femora. Wings hyaline, delicate, oblique veins very slender; cubital obsolete at base. Stigma conspicuous, dusky, rather acute at both ends, angled at base of stigmal vein, the latter sharply curved for two thirds its length, then nearly straight. Length of body about 2.50 mm., to tip of wings 3.90 mm. Honey tubes rather slenderer than in the apterous, imbricated, about 0.70 mm. long. Tail slender, upcurved.

On "cow tail" (*Erigeron canadensis*), in very large colonies. Lincoln, October 2, 1888; Weeping Water, October 10, 1888.

Specimens in the collection of the University of Nebraska (no. 136) and of the U. S. National Museum (no. 12).

98. **Siphonophora eupatorii** n. sp.

Apterous viviparous female: General color greenish or reddish brown. Antennae one and one half times as long as the body, brown to black. Legs brownish, with black joints and tarsi. Honey tubes twice as long as the tail; both shining black.

Winged viviparous female: Greenish to brown, head and lobes of thorax olive brown. Antennae one and a half times the body, black. Beak reaching hind coxae, black, with paler base and whitish rings at the articulations. Legs black, except femora. Wings with yellowish insertions and slender veins; the second branch of cubital very near the apex of the wing and in many specimens entirely wanting or represented by a thickening at the end of the vein. Stigmal vein curved only at the base, then straight or slightly recurved. The venation is very variable. Honey tubes and tail as in apterous female.

On white snakeroot (*Eupatorium ageratoides*), in company with *Aphis ageratoides* Oestlund, October, 1889. Apterous females and pupæ of a *Siphonophora* very close to, if not identical with the above, were collected September, 1890, on *Eupatorium perfoliatum* at Ashland not far from the place where that species was collected, differing only in being of a more uniformly greenish-

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brown color and having the tail concolorous with the abdomen. Length of body, 1.75–2.00 mm.; antennae, 2.90 mm.; honey tubes, 0.40 mm. The species has affinities with *Myzus*.

No specimens in either collection.

99. **Siphonophora euphorbiae** Thomas.

Thomas, Bull. Ill. St. Lab. Nat. Hist., 2, p. 6 (1878).

Thomas, *l. c. Siphonophora euphorbicola.*

Apterous viviparous female: General color pale green. Antennae longer than body; lower portion pale, apical portion dusky. Eyes black. Legs pale. Tarsi dusky. Honey tubes pale with dusky tips.

Winged viviparous female: General color bright green. Head and thoracic lobes brownish. Antennae considerably longer than body; black, with pale base. Wings large, hyaline, with yellowish insertions and subcostal, prominent but slender oblique veins; second branch of cubital arising nearer the apex of wing than to base of first branch; stigma dusky; stigmal vein curved nearly or quite its entire length. Honey tubes long and slender, dusky at tip, fully three times as long as the tail. Tail green, upcurved.

On spurge (*Euphorbia hypericifolia*). Ashland, October 9, 1889. Generally few in number and clustered on under side of leaves and on flower stalks. It is very probable that both of Thomas's species are the same thing. My specimens agree with the descriptions of both species and though his description of *S. euphorbicola* is the better one, having colors given, the specific name *euphorbiae* must be used as it precedes the other in his article.

100. **Siphonophora frigidae** Oestlund.

Oestlund, List Aph. Minn., p. 20 (1886).

Oestlund, Syn. Aph. Minn., p. 83 (1887).

Apterous viviparous female: Color shining dark green. Eyes black. Antennae on large frontal tubercles, as long as the body, black, with base of III paler; VII and III subequal in length. Beak reaching middle coxae, blackish. Legs black, with bases of femora paler. Dorsum tuberculate, hairy. Honey tubes imbricated, black.

Winged viviparous female: Head and thorax black. Antennae about as long as body, black, with base of III paler; III longer than VII, III and IV with sensoria. Beak rather long. Abdomen shining dark green, with a distinct metallic luster, hairy. Honey tubes black, imbricated, 0.50 mm. long. Tail black, obtuse, hairy, 0.35 mm. long. Length of body 2.35 mm., to tip of wings 4 mm.

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On *Artemisia frigida*. War Bonnet Canyon, June 23, 1890. Oestlund mentions his having found both apterous and winged males in this species. I was not able to find either, but the species was not very plentiful and I did not get many specimens, which probably accounts for it, and then it was rather early in the season also.

Specimens in the collection of the U. S. National Museum (no. 15).

101. **Siphonophora fulvae** Oestlund.

Oestlund, Syn. Aph. Minn., p. 80 (1887).

Apterous viviparous female: Green. Very thickly pulverulent, causing it to appear nearly white. Legs, honey tubes and the lower third of antennae pale; tarsi, tips of honey tubes and outer two thirds of antennae dusky to black. Tail rather small, pale.

Winged viviparous female: Head and thorax dark green to brown. Antennae longer than body, more or less dusky; III shorter than VII, IV and V subequal. Beak reaching beyond second coxae, 0.40 mm. long. Abdomen pale green. Honey tubes rather short, dusky to black. Tail stout, pale, equaling the honey tubes in length, 0.23 mm. long. Length of body 2.50 mm., to tip of wings 4.25 mm.

Found on the upper branches and leaves of the wild touch-me-not (*Impatiens fulva* and *I. pallida*) in company with *Siphonophora carnosa* var. *impatientis*. Ashland, October 5, 1889; Wabash, August 22, 1890.

Specimens in the collection of the University of Nebraska (nos. 137, 138, 139).

102. **Siphonophora gaurae** n. sp.

Apterous viviparous female: Pale yellowish green, shining. Antennae about the length of the body, on very large frontal tubercles, pale, with the tips of III, IV and V and all of VI and VII black; III and VII subequal. Eyes red. Beak reaching nearly or quite to hind coxae. Legs of medium length, pale, with femoral tips dusky and tibial tips and tarsi black. Honey tubes reaching beyond tip of abdomen, but not beyond tip of tail, 0.75 mm. long, pale, with dusky tips. Tail half the honey tubes in length, robust, hairy, pale yellowish. Length of body 3.25 mm., outline elongate ovate.

Pupa: Color as above. Legs, antennae and honey tubes shorter. Tail conical. Wing-pads pale green.

Winged viviparous female: Pale greenish yellow. Head and thorax pale

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olive. Eyes red. Antennae somewhat longer than the body, olive brown, with tips of III, IV and V and all of VI and VII black; VII longer than III, the latter with sensoria. Legs as in the apterous form. Honey tubes and tail more slender and not quite so long, otherwise similar. Wings delicate, with pale yellowish subcostal, dusky yellowish stigma, prominent blackish brown oblique veins. Stigmal curved gradually its entire length. Cubital nearly or quite obsolete at base; second branch originating equidistant from the apex of wing and the first branch. Length of body 3–3.40 mm., to tip of wings 4.50 mm.

Found very plentifully on *Gaura parviflora,* at Ashland, July–October, 1890. The green species of this genus are very hard to define. This species is similar to *S. pisi* and *S. pelargonii,* but differs in its shorter antennae, legs and honey tubes, the prominent discoidals and the color markings of the limbs. It was watched very closely during the season, and these characteristics were found to be constant.

Cotypes in the collection of the University of Nebraska (no. 140).

103. **Siphonophora gaurina** n. sp.

Apterous viviparous female: Broadly ovate. Head small, pinkish flesh-color, whitish-pruinose. Antennae on rather small frontal tubercles, hardly reaching to base of honey tubes, pale, tips of III and IV dusky; tip of V and all of VI and VII black; III a little longer than VII. Eyes red, with a very small brown tubercle. Beak reaching beyond the middle coxae. Legs short, tibial tips and tarsi black. Honey tubes not reaching to tip of abdomen (0.60 mm.), slender, larger at base, pale, with slightly dusky tips. Tail yellowish, three fourths the length of the honey tubes, rather slender, hairy. Length of body, 4 mm.

Pupa: Similar in every respect, except that the size is much smaller and the tail conical. Wing-pads whitish.

On *Gaura parviflora.* Ashland, September, 1890. This, in general appearance, is somewhat like *S. carnosa* Buckton. It is very different from that species, however, when studied closely; and, although found together with *S. gaurae,* is plainly specifically distinct from that species. It is much larger, of a different shape and much quicker in its movements than that species.

Cotypes in the collection of the University of Nebraska (no. 141) and of the U. S. National Museum (nos. 17, 397).

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104. **Siphonophora grindeliae** n. sp.

Apterous viviparous female: Pale pea green, no darker markings on the body. Eyes dark red. Antennae all pale, about the length of the body, III longest, IV and VII subequal. Beak only reaching to middle coxae. Legs all pale but tips of tarsi. Honey tubes long, reaching beyond the tip of the abdomen, slightly swollen just below the tip, pale green. Tail robust, about one third of the honey tubes in length, obtuse, hairy. The embryos can be seen very plainly in the abdomen of the female; their eyes appear almost black.

Pupa: Color as in the apterous form, but the antennae shorter than the body, with the tips of each joint and all of VI and VII dusky and VII as long as or slightly longer than III. Beak not reaching to middle coxae. Legs with the tarsi and tibial tips dusky. Wing-pads and thorax darker green. Honey tubes as in above. Tail short and conical.

Winged viviparous female: Color, eyes and tail as in apterous form. The honey tubes similar except that they are dusky toward the tip. Antennae longer than the body, blackish, pale at base; III longest and with sensoria. Beak only reaching to or slightly beyond the middle coxae. Legs pale, with dusky tibial tips and tarsi. Wings with slender brownish veins, subcostal pale yellowish; stigma grayish; cubital with branches varying. Stigmal vein sharply curved for the first half, then straight or slightly recurved. Length of body 2.55 mm., to tip of wings 4.40 mm., honey tubes 0.70 mm.

This is between *Siphonophora rubi* and *S. pelargonii,* having the size of the latter and the honey tubes of the former, and similar to both in color. It is similar in appearance to *S. pisi,* but differs in honey tubes and antennae as well as in the thoracic coloration.

On *Grindelia squarrosa.* Lincoln, May, 1889, and June, 1890.

Cotypes in the collection of the University of Nebraska (no. 142) and of the U. S. National Museum (no. 396).

105. **Siphonophora ludovicianae** Oestlund.

Oestlund, List Aph. Minn., p. 23 (1886).

Oestlund, Syn. Aph. Minn., p. 80 (1887).

Apterous viviparous female: Yellowish green, pulverulent. Eyes bright red. Antennae on large frontal tubercles, longer than body, black, with paler base; III and VII subequal in length, the former with a few sensoria. Beak reaching hind coxae, only the last joint black, acute. Legs black, with proximal two thirds of femora yellowish. Honey tubes black, pale at base, 0.55 mm. long. Tail robust, upcurved, almost as long as honey tubes, yellow. Length of body 2.80 mm.

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Winged viviparous female: Color as in apterous female, but with less pulverulence and head and thoracic lobes brown to black. Eyes dark red. Beak as in apterous, but more of it black. Antennae much as in apterous, only more shining black, rather longer, and III with more and larger sensoria. Wings with yellowish insertions, subcostal and stigma, the latter rather long and pointed; oblique veins slender, brownish; cubital obsolete at base. Legs, honey tubes and tail as in apterous female, but the two former with rather more black. Length of body 2.45 mm., to tip of wings 4.40 mm.

On *Artemisia ludoviciana*. Ashland, Lincoln, Fremont, June–October. Always in very small colonies or solitary, on the upper leaves and among the flowers.

Specimens in the collection of the University of Nebraska (nos. 143, 144) and of the U. S. National Museum (no. 399).

106. **Siphonophora luteola** n. sp.

Apterous viviparous female: Almost linear, very bright shining yellow. Antennae twice as long as the body, on medium sized frontal tubercles; shining black, with yellowish base; III with a few scattered sensoria, shorter than VII. Eyes black. Head broad. Beak reaching hind coxae, obtuse, apical third black. Legs robust, long, pilose, proximal two thirds of femora yellow, rest all black. Honey tubes dusky at base, growing blacker towards the tip, 0.80 mm. long. Tail robust, upcurved, yellow, about 0.50 mm. long. Length of body 2.10 mm.

Pupa: Very similar but with members generally shorter and paler. Wing-pads concolorous with abdomen.

A very pretty species found on golden rod (*Solidago missouriensis*). Ashland, September 20, 1890. In small colonies on the upper leaves and flower stalks. It is similar to *S. ludovicianae* Oestlund in some respects, but has longer antennae, black eyes and none of the characteristic mealiness of that species, besides being of a very bright yellow color.

Types in the collection of the U. S. National Museum (no. 398).

107. **Siphonophora menthae** Buckton.

Buckton, Mon. Brit. Aph., I, p. 120, pl. IX, figs. 1, 2 (1876).

Thomas, Ins. Ill., 8th Rep., p. 68 (1879).

Apterous viviparous female: Long oval, narrow at the head, very broad at middle of abdomen. Lively green, transparent and often permitting the eyes of the embryos within to appear as red specks. Abdomen usually exhibits delicate lines, as if they were the sutures of horny plates. An-

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tennae very long, slightly olive at the tips. Frontal tubercles very large and slightly gibbous. Eyes red. Head, thorax and abdomen consolidated and without perceptible separation. Honey tubes cylindrical, greenish and black at tips. Legs long, hirsute; genua olive; tarsi black; tail green. Size of body 2.02 by 1.01 mm.

Winged viviparous female: Bright green. Antennae dark olive, the two basal joints green. Eyes red. Thoracic lobes and scutum olive. Abdomen carinated, with four dark spots within the folds. Honey tubes fine and black. Legs green, hardly so long as those of the larva. Tarsi black, the gibbous character of the basal joints of antennae less marked. Wings with pale brown subcostal and stigma. Some specimens show disjointed transverse bars on the abdomen. Size of body 1.52 by 0.62 mm. Honey tubes about 0.50 mm. long. Antennae in both forms much longer than the body. (After Buckton.)

On wild mint (*Mentha canadensis*). Weeping Water, October 11, 1888.

108. **Siphonophora muralis** Buckton.

Buckton, Mon. Brit. Aph., I, p. 157, pl. XXVI (1876).

Apterous viviparous female: Body ovate, hairy. Color a rich chestnut brown. Antennae longer than body, black, with pale base; III longest, longer than IV, V and VI together, very thickly covered with sensoria, hairy. Eyes reddish brown. Beak reaching hind coxae. Legs very long, yellowish, with distal ends of femora, the tibial tips and tarsi black. Honey tubes tapering, black, 0.55 mm. long. Tail slender, acute, about three fourths the honey tubes, yellow.

Pupa: Similar, but with antennae, tail, honey tubes and legs shorter, and body generally smaller.

Winged viviparous female: Smaller and more linear than the apterous female. Antennae blacker and III with more sensoria. Head and thorax dark brown. Legs with a greater proportion of black than in the apterous form. Wings large, with yellowish insertions and yellowish brown subcostal and stigma; oblique veins slender, light brown. Honey tubes and tail as in apterous form. The general color is like that of the apterous form, but of a darker brown, generally. Length of body 2.75 mm., to tip of wings 4.25 mm.

Winged male: Smaller than the winged female. Wings more delicate. Head and thorax but little darker than the abdomen, otherwise as in that form. Length of body about 1.75 mm., to tip of wings 3.75 mm.

On wild lettuce (*Lactuca* sp.) throughout the season for the last three years; very common. Ashland, Lincoln, Weeping Water, Wabash, Fremont. The difference in size between the

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various forms is not so great as in Buckton's specimens, but I am sure this is his species.

Specimens in the collection of the University of Nebraska (nos. 145, 146, 147) and of the U. S. National Museum (no. 395).

109. **Siphonophora pelargonii** (Kaltenbach).

Kaltenbach, Mon. Pflan., p. 21 (1843). *Aphis pelargonii.*
Koch, Die Pflan., p. 193, figs. 265, 266 (1854). *Siphonophora pelargonii.*
Buckton, Mon. Brit. Aph., I, p. 136, pl. XV (1876). *Siphonophora pelargonii.*

Apterous viviparous female: Bright pea green. Eyes red. Antennae and tarsi dusky, the former much longer than the body. Honey tubes very long and slender (0.65 mm.), green. Tail robust, upcurved, not half the honey tubes in length, green. Size about the same as the winged female.

Winged viviparous female: As in the apterous form, but legs and antennae darker. Head and two spots on prothorax dark green. Thoracic lobes light greenish olive. Wings delicate, with pale insertions and grayish stigma; the veins rather prominent, brownish; VII longer than III. Tarsi and tibial tips blackish. Beak not reaching the hind coxae, with a sharp black tip. Honey tubes and tail as in apterous form. Length of body 2.20 mm., to tip of wings 4 mm.

What I take to be the male was found on hollyhock at Ashland, November 1, though I found no oviparous females. Head, prothorax, thorax, antennae, legs (except base of femora) and honey tubes black. Wings very long, with brownish stigma. Abdomen greenish, with blackish brown spots on the dorsum. Tail rather short, acute, brownish. Length of body 2 mm., to tip of wings 4.60 mm.

On under side of leaves of hollyhock. Ashland, November 1, 1890. On leaves of skeleton geranium. Omaha, January 16, 1891. Although formerly supposed to be but a hothouse louse, this species is able to stand severe cold. It was found at Ashland after considerable snow had fallen. Buckton and Koch both noticed this also.

Specimens in the collection of the University of Nebraska (nos. 148, 149, 150) and of the U. S. National Museum (no. 287).

110. **Siphonophora pisi** Kaltenbach.

On clover in greenhouse. Lincoln, December 30, 1890, specimens nos. 151 and 152, University of Nebraska collection.

111. **Siphonophora rubi** (Kaltenbach).

Kaltenbach, Mon. Pflan., p. 24 (1843). *Aphis rubi.*

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Koch, Die Pflan., p. 191, figs. 263–4 (1854). *Siphonophora rubi.*

Buckton, Mon. Brit. Aph., II, p. 140, pls. XVII, XVIII (1876). *Siphonophora rubi.*

Thomas, Ins. Ill., 8th Rep., p. 64 (1879). *Siphonophora rubi.*

Winged viviparous female: Large, shining green, slightly pilose. Long oval. Head narrow. Antennae and legs long and green; the articulations of the former are slightly marked with black. Eyes reddish brown. Honey tubes long, curved and slightly thickened at their bases, then constricted; inflated at their midst, and finally expanded at their mouths. Tail large and hairy. Tarsi black. Length of body 3.30 mm., of honey tubes 1.27 mm.

Winged viviparous female: Very large, wholly green but rather redder on the thorax. Head with conspicuous red ocelli. Antennae nearly half as long again as the body, rest of insect like larva. Wings iridescent, with yellowish insertions, yellow subcostal and stigma; the whole insect slightly pilose. Length of body 3.04 mm., of honey tubes 1.01 mm.

Winged male: Green. Head very broad and black. Ocelli distinctly marked. Antennae very long. Back thorax and prothorax green, with black linear thoracic lobes and small scutellum. Abdomen very small, not equal to the length of the head and thorax together. Four or five transverse dark green dashes on dorsum. Honey tubes as in winged female. Legs disproportionately long. Tail small. Wings remarkably large. Stigma gray. From the under side the valves which support the penis can be easily seen. Some males are redder than the above. Occasionally the wings want the second cubital fork. Also the clavate character of the honey tubes is more marked in some specimens than in others. Length of body 2.54 mm., of honey tubes 0.50 mm.

Apterous oviparous female: Form oval or sac-like, drawn out towards the head. Green, slightly pubescent. Antennae and legs relatively longer in this sex than in the viviparous female, a remark which does not usually apply to other species. As the eggs approach maturity they appear like oval whitish masses under the skin. After deposition and exposure to the air they turn lustrous black. About 2.80 mm. long. (After Buckton.)

Found on cultivated raspberry. Lincoln, October 21, 1888. Only a few winged viviparous females and larvae were found, but they agree exactly with Buckton's description, so I am sure of the species. This is another of the species that show affinities to both *Siphonophora* and *Rhopalosiphum,* and is rather difficult to locate satisfactorily.

Specimens in the collection of the U. S. National Museum (no. 393).

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112. **Siphonophora rudbeckiae** (Fitch).

Fitch, St. Cab. Nat. Hist., p. 66 (1851). *Aphis rudbeckiae.*

Thomas, Bull. Ill. St. Lab. Nat. Hist., No. 2, p. 4 (1878). *Siphonophora rudbeckiae.*

Thomas, Ins. Ill., 8th Rep., p. 49 (1879). *Siphonophora rudbeckiae.*

Oestlund, Syn. Aph. Minn., p. 85 (1887). *Siphonophora rudbeckiae.*

Apterous viviparous female: Very large. Bright red. Antennae about as long as the body, black, with paler base. Legs black, except the base of femora and upper half of tibiae; very long. Honey tubes very long, black. Tail over half the honey tubes in length, yellowish, the dorsum without the tubercles found on *S. ambrosiae* Thomas. Length 4–4.20 mm.

Winged viviparous female: General color red. Head and thorax a little darker. Antennae on large frontal tubercles, much longer than the body, black, paler at base; VII longer than III. Eyes black. Beak long, about as long as the honey tubes. Legs all black but the immediate base of femora. Honey tubes very long, 0.80–0.95 mm., cylindrical, shining black. Tail more than half the honey tubes in length, yellowish, upcurved and rather acute. Size somewhat smaller than the apterous female.

Very common throughout the season on *Silphium* sp., *Ambrosia* sp., and many other Compositae. There are several different color varieties. The one on *Silphium* and *Rudbeckia,* a bright red form, is considered to be typical. All of the red and brown forms on the composites are very closely allied.

Specimens in the collection of the University of Nebraska (no. 153) and of the U. S. National Museum (nos. 366, 377, 391).

113. **Siphonophora solidaginis** (Fabricius).

Fabricius, Ent. Syst., IV, p. 211 (1794). *Aphis solidaginis.*

Kaltenbach, Mon. Pflan., p. 32 (1843). *Aphis solidaginis.*

Koch, Die Pflan., p. 197, figs. 269, 270 (1854). *Siphonophora solidaginis.*

Buckton, Mon. Brit. Aph., I, p. 156, pl. XXV (1876). *Siphonophora solidaginis.*

Apterous viviparous female: General color bright red. Elongate ovate. Dorsum with regularly arranged rows of very small black tubercles, out of each of which proceeds a black hair. Front hairy. Antennae black, with pale base, pilose, on large frontal tubercles; III longest. Head brownish in many individuals. Eyes dark red. Beak reaching nearly or quite to hind coxae, dusky to black. Legs long; tibiae, tarsi and distal end of femora black, pilose. Abdomen arched, but segments generally well defined. Honey tubes rather long, tapering, then widening at tips, shining black, 0.60–0.80 mm. Tail about two thirds the honey tubes in

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length (0.50 mm.), rather acute, hairy, upcurved, dusky to almost black. Length of body 3 mm.

Pupa: Smaller, lighter colored, antennae and legs shorter. Wing-pads blackish.

Winged viviparous female: Slightly larger than the apterous female. Bright red. Head and thorax shining black. Antennae longer than body, colored as in apterous female. Abdomen without tubercles, pointed behind. Honey tubes, legs and tail as in apterous female but generally with more black. Wings with yellowish insertions, costal and subcostal; stigma dusky gray, very long, acutely pointed; oblique veins slender and brownish.

Winged male: Smaller than winged female. Head and thorax shining black. Antennae very long, black, on rather small frontal tubercles. Wings very large, branches of cubital and stigmal coming very close together and running almost parallel, otherwise as in female. Legs with more yellow. Abdomen small, with brown marginal spots and irregular markings on the dorsum. Honey tubes and tail as in female, but smaller. Length of body 2.40 mm., to tip of wings 4.50 mm.

On leaves and flower stalks of golden rod (*Solidago* sp.). Very plentiful at Ashland during the later summer and autumn months. Distinguished from *S. rudbeckiae* by its movements and tuberculate dorsum, and from *S. ambrosiae* by its color and black head and thorax.

Specimens in the collection of the University of Nebraska (nos. 154, 155) and of the U. S. National Museum (nos. 288, 387, 388).

114. **Siphonophora verbenae** Thomas.

Thomas, Bull. Ill. St. Lab. Nat. Hist., No. 2, p. 8 (1878).

Thomas, Ins. Ill., 8th Rep., p. 63 (1879).

Apterous viviparous female: Elongate oval. Bright pea green, generally with a median stripe of darker green and more or less distinct marginal stripes. Antennae about the length of the body; I, II and most of III pale, apex of III and the remaining joints dusky to black. Eyes red. Legs very long, pale, with dusky to black tibial tips and tarsi. Honey tubes long, slender, green, with dusky tips. Tail half the honey tubes in length, green.

Winged viviparous female: Green. Head, two basal joints of antennae and thoracic lobes olive brown. Eyes red. Antennae longer than the body; all black but a very small part of the base of III and the two basal joints; VII rather longer than III, the latter tuberculate. Beak reaching to or slightly beyond middle coxae. Wings with pale yellowish insertions, slender brownish veins, grayish stigma and venation variable. Legs dusky, with whitish femoral bases, black femoral and tibial tips and tarsi, hairy,

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especially the tibiae. Honey tubes green to dusky. Tail shorter than in apterous form, more slender and acute, green to slightly dusky. Length of body 2.40 mm., to tip of wings about 4.50 mm., of honey tubes 0.60 mm.

On *Verbena stricta*. Lincoln, October 16, 1888, at which time only an apterous form was found. On *Verbena* sp. in greenhouse, Lincoln, January 12, 1891.

I am not sure that this is Thomas's species; it differs in a few points, but as he had only immature specimens his description is not very complete, and that can account for all the differences. The young apterous forms agree with his specimens.

Specimens in the collection of the University of Nebraska (no. 156) and of the U. S. National Museum (no. 390).

Genus **Phorodon**

115. **Phorodon cynoglossi** n. sp.

Apterous viviparous female: Pale green, with tips of antennae, tarsi and tips of honey tubes black. A median stripe of a reddish tinge. Eyes very dark red. Front with short capitate hairs. Antennae on toothed tubercles and with I gibbous on inner side.

Pupa: As in apterous form, but with a band of dark green on each side of the abdomen and with the posterior two thirds of the reddish median stripe replaced by dark green (sometimes the median stripe is all green). Tail short and conical and an irregular dark green band at base of each wing-pad; wing-pads pale, with tips sometimes dusky. The margins of the prothorax projecting out so as to appear almost as if with lateral tubercles.

Winged viviparous female: Head, thorax and prothorax dark olive brown. Head more or less pointed in front. Antennae with two basal joints and tips brown, rest pale; III and VII subequal; III tuberculate; all joints more or less annulated; on distinctly toothed tubercles, and with I gibbous. Neck green. Sides of thorax and wing insertions yellowish. Wings delicate; veins slender but well defined; subcostal rather heavy. Oblique veins all more or less curved; cubitus with second branch nearer the first than to the apex of the wing; in some specimens it is very much nearer. Stigma dusky, long, very obtuse at inner end and acute at outer. Stigmal vein heavy and very sharply curved for its entire length. Legs pale to dusky, with blackish femoral and tibial tips and tarsi. Abdomen greenish, with a double row of brown marginal spots, a large irregular, subquadrate, dorsal spot of light olive brown and various irregular greenish or brownish markings over the dorsal surface. In some individuals the reddish tinge on the anterior portion of the abdomen can be noticed

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as in the pupae. Honey tubes reaching to tip of abdomen, clavate, brown. Tail short, slender, acute and brown. Length of body 2 mm., to tip of wings 3.75 mm.

When first noticed only the apterous females and pupae could be found. On January 5 the first winged individuals appeared. The species is close to *P. galeopsidis* (Kalt.), but differs in coloration, in venation of the wings, in color and shape of stigma, in shape of stigmal vein, and in the arrangement of the markings on the abdomen, besides feeding on a plant of an entirely different order. On forget-me-not (*Cynoglossum* sp.) in the greenhouse of the botanical department of the State University, December, 1890, to January, 1891.

Cotypes in the collection of the University of Nebraska (nos. 157, 158, 159) and of the U. S. National Museum (nos. 141, 142).

116. **Phorodon monardae** n. sp.

No description. Type from Ashland, May 24, 1890, on *Monarda festulosa,* in collection of University of Nebraska, no. 160.

117. **Cryptosiphum canadensis** n. sp.

Apterous form: Pale green. Antennae nearly as long as the body, with a few scattered hairs; VII about two and one half times VI; pale, with the last half of IV, V, VI and VII black. Front with a few long stiff hairs. Legs short, the femoral and tibial tips and tarsi black, rest paler. Eyes black. Honey tubes and tail wanting. Length of body 2.40 mm.

Winged form: Smaller than the apterous form. Head, thorax and antennae black. Antennae on rather inconspicuous frontal tubercles, widely separated at base, as long as body; VII at least three times VI; with fewer hairs than apterous form. Front with stiff hairs. Eyes black. Beak reaching middle coxae. Legs more or less hairy, colored as in apterous form. Wings with yellowish insertions, slender, dusky veins and broad dusky stigma. Abdomen dark green, apex hairy. Honey tubes represented by small pores. Tail hardly noticeable. Length of body 1.90 mm., to tip of wings 2.95 mm.

On *Artemisia canadensis.* War Bonnet Canyon, June 24, 1890, and on *Art. ludoviciana,* Fremont, July 31, 1890. It is found on the under side of the leaves and on the stem. It causes the leaves to curl up more or less. It is easily distinguished from *C. artemisiae* Buckton, the only other species in the genus, by its color, longer antennae and legs and much longer seventh antennal joint

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and lack of mealy substance in all forms. It is very agile and when disturbed runs away rapidly and hides itself.

Cotypes in the collection of the University of Nebraska (nos. 161, 162) and of the U. S. National Museum (nos. 36, 37, 148).

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UNIVERSITY STUDIES

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TRADE AND THE FLAG

BY MINNIE THROOP ENGLAND

Present colonization is undertaken and supported almost wholly from economic motives,[1] chief among which is the wide-spread and oft-spoken belief that colonies furnish a peculiarly favorable field to the governing country for the development of trade and commerce. An inquiry into the real support which the present colonial trade gives to that belief should not be fruitless.

Formerly the word "colony," in popular usage, meant the same as that which is now termed a settlement colony. The acquisition of land unfit for settlement purposes has made it necessary, however, to expand the meaning of the term to include commercial and plantation as well as settlement colonies. In its broad sense, therefore, a colony may be defined as an outlying possession under a different administrative system from that of the mother country.

But even after defining a colony in simple terms the application of the definition is difficult. Nominally Egypt is a Turkish possession; in reality it is in all essentials a British colony. Which is its mother country? Again, the westward expansion of the United States and the eastward expansion of Russia in adjacent territory present all the characteristic features of colonization, yet, since the territory has been absorbed by the mother country

[1] Economic motives are predominant in other lines also as well as in colonization. Ireland (*China and the Powers*, 4) says that at "the present day the political action of nations is determined almost entirely by economic considerations."

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instead of retaining its identity, it falls outside of the hard and fast lines of the definition. Finally, there are outlying possessions under the same administration as the mother country, yet which it seems best to consider as colonies. For example, Algeria is treated as part of France, and for administrative purposes the Canary Islands are regarded as part of Spain, yet they are essentially colonial in character.

There are at the present time fifteen countries which possess colonies. The eight which control the largest territories are—naming them in order—the United Kingdom, France, China, Germany, Belgium, Portugal, the Netherlands, and the United States.

The figures involved in discussing colonial areas and populations are so large that they convey little of their real meaning. The United Kingdom ranks first as a colonizing power both in the number of square miles occupied and the number of people governed, and France takes second place. Germany entered the race late but has succeeded in securing control of more than a million square miles, a territory five times as large as the German Empire. The sole Belgian possession, Congo Free State, represents a vast territory in Central Africa which, because of its unique position of responsibility to one man[2] instead of to a nation and because of the avidity with which it has been exploited, has been kept in the forefront of popular discussion. Russia's fondness for acquiring territory is well known, yet since its expansion is chiefly adjacent and rapid absorption follows, Russia has, strictly speaking, only two dependencies to be considered, Bokhara and Khiva. China's hold over her possessions is more or less nominal. They comprise Manchuria, Mongolia, Tibet, and Chinese Turkestan.[3] Japan stands near the foot of the list in extent of colonial territory, yet her evident imperialistic ambitions have given her a prominent position among colonizing nations, and incidentally put a check upon the attempted dismem-

[2] The death of King Leopold II removes this distinction.

[3] The province of Chinese Turkestan is officially called Sin-chiang or the New Dominion. Deasy, *In Thibet and Chinese Turkestan*, 328; see also *Statesman's Year-Book*.

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berment of China by the western powers. Spain is a declining colonial power, yet she still controls about 80,000 square miles—enough territory to make half a dozen Formosas. Turkey, too, through misrule, sees its possessions slipping away entirely or retained only nominally. Since Bulgaria declared independence there remain but Egypt, Samos, Crete, and Anglo-Egyptian Soudan. Austria-Hungary took the occasion of the recent Balkan troubles to declare her occupation of Bosnia and Herzegovina permanent, a move which did not occasion great surprise, however. Since the decline of the Danish West Indies, Denmark's most prosperous colony is Iceland. The Dutch, by their work in Java, have attracted much criticism both adverse and favorable. Portugal, like some of the other colonizing nations, seems to be more successful as a colonial exploiter than as a developer of colonies.

The fact that the colonizing nations expect to reap some economic gain, especially in the line of trade, from their possessions, makes the question "Does trade follow the flag?" ever a timely one. But in order to determine whether any part of the commerce between the mother country and its colony, aside from tariff-controlled trade, is due to their political relations, a consideration in some detail of the main factors influencing the movements of goods is necessary. Some general propositions regarding trade are, therefore, presented.

Trade, if not interfered with, follows the *price list*.[4] Efficiency and economy of industrial production are more and more recognized as the chief factors in expanding trade. An English writer gives as his view of the causes of American success in trade the fact that, in the first place, an American is not content with one thriving business but will speculate in another enterprise or even twenty, and greater risks mean greater opportunities for gain. An English firm has been known to refuse to book orders because it had enough work for two years ahead; an American firm would have risked an extension of plant and continued taking orders. In the second place, an American will sell at a loss to create a

[4] *Cf.* Farrer, "Does Trade Follow the Flag?" in *Contemporary Review*, 74: 832.

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market, and trust to gradually increasing the price until it is remunerative. Finally, the American business man is quick to pick out the efficient man in his business and promote him, while the Englishman is liable to allow prejudices of castes, nationalities, precedents, or family connections to influence promotions at the expense of efficiency. Van Cleave,[5] on the subject "What Americans must do to make an Export Business" says: "We must make better goods than our European competitors. We must improve our methods so that we can sell those goods as cheaply as our competitors sell inferior goods, or cheaper. We must do this notwithstanding the lower prices which Europe's employers pay for labor. . . . We must equip our laborers to do more work than the Europeans do in the same length of time, and do it better.

"To this end we should establish manual training departments in all our public schools, in which boys, beginning at the age of ten or eleven, could learn to handle all the tools used in the ordinary mechanical trades, and we should provide trade high schools in which boys who pass through the manual training branch of the primary schools could become first-class mechanics."

Again, trade is unquestionably influenced by the *geographical position* of countries.[6] Canada, for example, gets about 70 per cent of her imports from sources outside of the British Empire, and the larger part of this, or 56.7 per cent of the total imports, comes from the United States.[7] Nor does trade in the West Indies follow the flag, but continually drifts towards its natural market the United States.[8] It is well recognized by European countries that the geographical position of the United States gives that country an advantage over them in West Indian, Mexican, South American, Canadian,[9] and also Asiatic trade. For the same

[5] Annals of the American Academy of Political and Social Science, 29: 34–35.

[6] *Cf.* Flux, "Flag and Trade," in *Journal of the Royal Statistical Society*, 62: 524. Caillard, "An Empire in the Making," in *Monthly Review*, 18: 43.

[7] Caillard, *op. cit.*, 38.

[8] *Cf.* Bigelow, *Children of the Nations*, 305–306.

[9] *Cf.* Root, *Trade Relations of the British Empire*, 60–61.

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reason—geographical situation—the United States secures the larger part of French Tahiti's trade;[10] although the trade of the Society Islands with the United States was somewhat less in 1906 than in 1905, owing to the San Francisco earthquake, yet 48 per cent of the imports were drawn from the United States, and 44 per cent of the exports went thereto.[11] Japan's geographical position in turn gives her an advantage over her western rivals, in trade as well as in strategic position.[12] Formosa's trade with China is larger than with any other foreign country,[13] for though the island is politically Japanese, it continues commercially Chinese, since, according to Parker, 95 per cent of the trade is either with the mainland or with Honkong.[14] Later returns, however, show that part of the Formosan trade with China is being transferred to Japan.[15]

The strength of *custom* as a factor in trade[16] is well shown in German Southwest Africa. The natives there had been accustomed to buy of the English, and the early German traders found it necessary, in order to sell their goods, to substitute English trade marks for their own.[17] The strength of the hold of custom, however, varies according to the temperament of people. The restless spirit, such as we find in the United States, buys, now here and now there, always in the hope of betterment.

[10] *Cf. Statesman's Year-Book,* 1903, 640.

[11] Dreher, "Society Islands," in *U. S. Consular Reports,* September, 1907, 103.

[12] *Cf.* Stead, *Great Japan,* 204; Stead, *Japan To-day,* 231.

[13] *Cf.* Colquhoun, *Mastery of the Pacific,* 395.

[14] Parker, *China,* 142.

[15] "A change has already taken place in that the Japanese goods which have hitherto been imported through Hong Kong and Amoy, now come direct from Japan, and many of the exports to foreign countries are now sent by way of Japan. The natives, who used to wear clothes of Chinese manufacture, and live on food grown in China, are now beginning to use Japanese manufactures. The trade relations between Formosa and Japan are becoming closer and closer."—Takekoshi, *Japanese Rule in Formosa,* 271–272.

[16] *Cf.* Parkin, *Imperial Federation,* 290

[17] *Cf.* Keller, *Colonization,* 569

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The *size of the buyer's pocket book* affects trade. A poor country will not buy the same kind nor the same quantity of goods as a richer country. In making goods for such peoples as the Chinese, the manufacturer, in order to be successful, must continually bear in mind the extreme poverty of the people.[18] In the African Mediterranean States, also, the chief desideratum in purchasing goods is cheapness, and the Germans, recognizing this fact, have been very successful in establishing trade there.[19]

The *character of the salable products* also helps determine the direction of trade. The French carry on a large trade with their older colonies, which have the larger part of the French settlers, but in their new territory in Asia and Africa, they have only a small portion of the trade. The reason for this is that French manufacturers do not provide the articles which are required by a new and undeveloped country. One reason that Australia trades with England, rather than with the United States, is because England wants the wool that Australia is ready to furnish, and Australia wants the finished products that England provides. The United States, on the other hand, does not want Australian wool, so the character of the trade between Australia and the United States is very different from that of England with the former country. While Canada imports largely from the United States, Canadian products do not find a natural market in the United States, because the latter country itself yields so large a surplus of the same kind of products. If, therefore, free intercourse was established between the two countries, Canada would not profit largely from the change. Great Britain, on the contrary, happens to be the natural market for Canadian goods, so that they may be expected to go very largely to the mother country.[20] It does not necessarily follow, therefore, that the products of mother country and colony are adapted to exchange.

Commercial travellers everywhere play an important part in

[18] Anderson, "Trade Conditions in China," in *U. S. Monthly Consular Reports*, January, 1905, 51–52.

[19] Mansfield, *In the Land of Mosques and Minarets*, 40–41.

[20] Root, *Trade Relations of the British Empire*, 61.

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the extension of trade. Consuls have emphasized time and again the necessity of having representatives on the spot, who are familiar with the language of the people to whom they wish to sell, and who are skillful in pointing out the superiorities of the products they represent. Germany's success in trade is partly due to the fact that she has been foremost in adopting these suggestions, and has sent commercial travellers to all parts of the world to push German commercial interests.

Trade is influenced by *promptness, carefulness, and adaptability on the part of shippers.* Even such a seemingly unimportant matter as the making of invoices, if conducted carelessly, may lose trade. Complaints have come from Cuba that the United States merchants fail to make the invoices conform to the customs regulations, thus causing delay or heavy fines. Instances are known of Cuban merchants ordering goods from Europe for the sole reason that European merchants were careful to comply with their instructions. The loss of the trade of the United States with Java in 1903, as compared with 1902, was partly because goods inferior to samples shown were delivered, the delivery was slow, the packing poor, and often shippers failed to make good the losses from poor packing.[21] The Germans, on the other hand, are quite remarkable in their adaptability. They quickly see the needs of a particular place and regulate their business accordingly.[22]

The foregoing discussion tends to answer in the negative the oft-repeated question, "Does trade follow the flag?" It is quite in harmony with the following statement by Burrell:[23] "The interdependency of all countries shows that, commercially, the definition of a country is impossible. The stream of commerce runs through the nations in the same way as blood runs through the body, or as sap runs through a tree. It would be just as absurd

[21] Rairden, "Trade of Dutch Indies in 1903," in *U. S. Monthly Consular Reports*, January, 1905, 189–190.

[22] Elkind, "The German Troubles in South-West Africa," in *Fortnightly Review*, 83: 254–255.

[23] Burrell, "Plea for Absolute Free Trade," in *Westminster Review*, 160: 483.

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to speak of an arm as being a separate organism as to speak of a state being a separate country commercially. A State is to-day an integral part of one commercial whole, just as an arm is an integral part of the body to which it belongs. Trade, when left to itself, takes no more account of Governments than do migratory birds and fishes. And why it should, passes my comprehension."

But while political relations aside from tariff regulations have no direct influence upon the channels of trade, they do have quite a pronounced indirect bearing on the same, and one may safely say that there is usually some portion of the trade between mother country and colony which would not be in existence if the political ties were different. Whether this portion is a large or a small one is another question. Some of the influences at work to increase the trade between mother country and colony as compared with the trade of countries politically separate follow:

Investment follows *a* flag,[24] and *trade follows investment.* In other words the flag stands for security, which is so essential for the development of a large trade. Security is of two kinds: safety of life and property, and security arising from policies of government or trade which are known to be stable. American politics, for example, give an instability to industry which is unknown in England. The fact that business to-day is carried on almost exclusively by means of credit, the very foundation of which is confidence, lends added importance to security. Enterprise languishes whenever it is uncertain, or at least whenever there is not a fair prospect that the usual fruits of industry will be enjoyed. This applies to the colony as well as elsewhere.[25] The nature of the country which plants the flag is, therefore, of great moment to the commercial world. But there is, undoubtedly, often a feeling that capital is more secure under the flag of one's own country than under a foreign one. Capital has followed the British flag under the more or less definite belief that the Imperial Legislature could not, or would not, suffer a

[24] *Cf.* Caldecott, *English Colonization and Empire,* 186.
[25] *Cf.* Wakefield, *Art of Colonization,* 81.

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colony to become bankrupt. The amount of power possessed by the Colonial Office is not investigated by the ordinary investor yet the sentiment of security remains.[26] A similar confidence is to be found among the citizens of other advanced countries, especially Germany, France and the United States. Investments thus tend to follow the flag and trade follows investments. Every extension of purchasing power means a movement of goods in some part of the world. The payment of interest or dividends, or the repayment of loans means that a larger amount of goods is being circulated. There are large investments in many of the colonies and these investments go out in the form of railway materials, telegraphic appliances, etc. Caldecott accounts for England's large per capita colonial trade on the ground that English capital has shown a preference for the colony and the borrowing of capital determines the flow of trade.[27]

Trade also follows the citizen. Germany recognizes this fact in encouraging emigration to the German settlements in southern Brazil. While disclaiming any intention of conquering any of the South American territory, Germany knows that the emigrant who goes to join the thousands of prosperous German agriculturists there will remain a purchaser of German goods longer than if he settled among other nationalities. The descendants of these settlers have, through generations, preserved their identity as Germans, and, therefore, still show a preference for goods of German

[26] Caldecott, *English Colonization and Empire*, 188.

[27] *Ibid.*, 188–189. Conant (*United States in the Orient*, 74) says: "The development of a new country by means of railways, roads, and docks is the forerunner of higher civilization, better wages, enlarged wants, and increased consumption. The benefits of this larger market for goods usually fall to the country which provides the capital for the primary development, especially if it is that country also which, by its political control, affords the guaranties of security and order." Professor Conant does not give the reasoning by which he reaches the above conclusion and the writer has been unable to discover any real foundation for it. Even if we agree that the benefits of the larger market usually fall to the country making the initial outlay, it is difficult to see where the commercial advantages arising from political control come in.

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origin.[28] In all the colonies the majority of the population other than native is usually from the mother country. In the tropical colonies especially, while the white population is very small, it is almost entirely from the mother country. For example, of the 2,346 white or European inhabitants in Congoland in 1902, 1,465 were Belgians.[29] Where the home nationality thus preponderates it is not at all strange if the chief orders for goods for colonial use should be placed with the mother country.

The English colonies bear testimony to the fact that the colonial is a good customer of the mother country. Taking man for man, the people of the English colonies, exclusive of India, consume British products to a much larger amount than do foreigners. The average annual per capita consumption of British manufactures is about 8s. in the United States and Germany, 9s. in France, £1 15s. in Canada, £2 5s. in the West Indies, £3 in South Africa, and nearly £8 in Australasia. "Thus three or four millions of people in Australasia take more of British goods than about fifty millions of people in Germany, and nearly as much as sixty millions of people in the United States. Only an artificial boundary separates Canada from the United States, yet an emigrant who goes north of that boundary immediately begins to purchase more than three times as much of British goods as one who goes south of it. As a customer to the British artizan one Australian is worth sixteen Americans; one South African is worth seven or eight Germans." [30]

One of the best illustrations of the manner in which trade follows the citizen comes from the Cape of Good Hope. While American locomotives and trucks are eminently suited to the railway service between Cape Town and Pretoria—a distance of one thousand miles—the prejudice of English railway employees against anything except the English machinery to which they had been accustomed, proved to be an insurmountable obstacle to any

[28] *Cf.* Speck von Sternburg, "The Phantom Peril of German Emigration to South American Settlements," in *North American Review*, 182: 644.

[29] Bourne, *Civilisation in Congoland*, 281.

[30] Parkin, *Imperial Federation*, 289.

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innovations. At one time, two Baldwin locomotives and a dozen freight cars were brought out from Philadelphia. They worked very well so long as the American manager remained in charge, but when he returned to America everything began to go wrong for the English workmen took especial satisfaction in discovering difficulties for the new engines. The result has been that these prejudices have won, and all the colonial railways of British South Africa are a duplicate of the system in England.[31]

The services of missionaries in promoting trade have been considerable and further illustrate the fact that trade follows the citizen. "You have heard it said that trade follows the flag. On the contrary trade follows the missionary and the flag follows trade. A missionary goes into the Himalaya Mountains; soon he is not satisfied to see the women drudging at their poor sewing, accomplishing so little with such great pains, and he sends for a Singer sewing machine. The missionary to China does not like to see children die for want of proper nourishment, and he sends for Nestlé's food. The missionary to Burmah has compassion for his poor people, subject to rheumatism and to the bites of venomous reptiles and insects, and he sends to Rhode Island for a famous pain-killer. So trade begins."[32]

A *knowledge of the peoples and the conditions existing in the countries to which one wishes to sell* is essential to success. And this knowledge must extend even to the psychology of the desired customers. Brown, writing regarding trade in the Canary Islands, says: "In fact, the exporters must bear in mind that their customers are passing through the stage when artificial flowers are considered superior to the natural article."[33] That Japanese manufacturers know the desires of their customers in the Far East gives them a distinct trade advantage there, of which fact Japan is cognizant.[34] And the Japanese are not content with this natural advantage but they are putting forth great

[31] Bigelow, *White Man's Africa*, 154–155.
[32] Grant, *Observations in Asia*, 119–120.
[33] Brown, *Madeira and the Canary Islands*, 268.
[34] Stead, *Japan To-day*, 231; Stead, *Great Japan*, 204.

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efforts to gain a stronger foothold in the world's commerce. In 1895 Japan began the practice of sending out special individuals to obtain information regarding trade conditions and possibilities of other countries. From 1895 to 1901, 124 of these investigators, many of whom are students, were sent abroad by the Government. This plan proved so fruitful that it is being adopted by Japanese business houses. The concern Mitsui Bussan Kaisha has set apart 30,000 yen annually to meet the expense of sending young men to China, and other nations for the promotion of its business.[35] It is quite true that the tastes of people must first be learned before one knows what to offer them. Standards of value must be mastered that prices may be expressed in terms intelligible to the prospective buyer. The customary use of credit and the prevailing rates of interest must also be determined. It was expected by many that the recent political relation between the United States and Cuba would, of itself, tend to increase trade between the two countries and that immediately. It was forgotten that close commercial relations had existed for years between the Cuban merchants and those of Europe, and that on each bill of goods it was customary to extend credit for six to eighteen months. The rate of interest in Cuba being from eight to fifteen per cent made the extension of credit of great importance to the Cuban merchants. The United States merchants not being accustomed to such long credits have, as yet, only partially adapted themselves to the Cuban situation. On the other hand, Germany's commercial importance in South America is largely ascribed to the fact that she sends there commercial travellers who have a knowledge, not only of the German language, but of Spanish and English, and who, moreover, are prepared to give from six to twelve months' credit. Van Cleave says: "But we need something more than a merchant marine to enable us to win new markets, or to hold those which we now have. We must learn the world's needs and tastes in merchandise, and set to work intelligently to supply them. This is particularly true of South America. Partly through better shipping facilities, but

[35] Stead, *Great Japan*, 191–194.

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chiefly through a better knowledge of the people and their wants, England and Germany are far ahead of us in their trade with South America. In 1906 we bought twenty per cent of all the merchandise which South America exported, but we sold to her only twelve per cent of what she imported." [36]

Since the citizens of a country are more apt to have an intelligent knowledge of their own colonial possessions than they would have of the same teritory if it were controlled by another country, another factor which favors trade following the flag, appears. Commercial agents are sent from the mother country to the colony to get a first-hand view of the situation; the newspapers and magazines abound with articles concerning the home colonies; and book agents find plenty of well-illustrated books ready to meet their demands. Within recent years an extensive literature on colonial questions has come into existence and has found many readers.[37] The owners of the various African colonies and dependencies have carried on most extensive explorations and investigations in their territories. The result is that Africa, with few exceptions, is better mapped than South America. The French in their possession, and the Germans in Kamerun, have kept many surveyors busy. The German maps are marvellously detailed, showing all variations in the surface, the plateaus, savannahs, water courses, and the native villages and their connecting paths. In 1903 they issued a map showing the distribution of metals and other minerals in the vast region of German East Africa. Austro-Hungary has recently published a colossal official report on Bosnia and Herzegovina which contains much valuable information.[38] The various colonial institutes of Europe are also invaluable for acquainting the people of the mother country with conditions in their colonies. The universities, more-

[36] Van Cleave, "What Americans must do to make an Export Business," in *Annals of the American Academy of Political and Social Science*, 29: 31.

[37] Among the later books Stokes' *Mines and Minerals of the British Empire* is an excellent example of carefully prepared and detailed information regarding colonial conditions.

[38] *Cf.* Thompson, "A Ride through Bosnia and the Hercegovina," in *Nineteenth Century*, 61: 696.

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over, give some attention to colonial affairs. The Prussian government in 1887 established an Oriental seminar, which is connected with the University in Berlin, and which offers special facilities for studying the languages of Oriental countries, and the native languages of the German colonies. It also offers courses upon colonial subjects, such as tropical hygiene, colonial geography, and economic botany.[39] Similar colonial courses are being introduced in some of the American universities. In addition, visits from mother country to colonies and from colonies to mother country increase the general knowledge of imperial conditions. Englishmen especially are going out in increasing numbers to visit the colonies and many colonists in turn visit England.[40] The addresses and lectures of returned missionaries, or those home on a visit, have been a considerable source of information to the general public regarding colonial conditions. According to Caldecott[41] the knowledge necessary to the great mass of the English people for the proper exercise of citizenship in an imperialistic country like England is supplied chiefly by their religious organizations.

In many instances, nevertheless, the grossest ignorance is shown regarding the colonial possessions. French writers have not hesitated to charge the colonial disappointments of France to a national lack of knowledge regarding colonial conditions—their importance, size, wealth, needs and interests. Not a single authoritative work has, according to Maugham, as yet been written about the vast territory of Portuguese East Africa, and thousands yearly pass it by without notice. But this colony is too near occupied territory, however, to be neglected much longer.[42]

The *use of a common language* facilitates trade between countries with this bond. For this reason attention is being called to the fact that the Germans are exerting themselves to increase their

[39] Loeb, "German Colonial Fiscal System," in *Publications of the American Economic Association*, 3d ser. 1: 438–439.

[40] Caldecott, *English Colonization and Empire*, 243.

[41] *Ibid.*, 256.

[42] Maugham, *Portuguese East Africa*, 330–331.

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linguistic hold in the extreme Orient, and that growing attention is being paid to German in Japan without outside help.[43] In colonial work the French, Spanish and Portuguese try more than other nations to assimilate the native populations, and they are very successful in promulgating language, in which work the Catholic church is a great aid. In many cases their languages have outlived their rule. The French have thus left the impress of both religion and language upon the French islands of Martinique and Guadeloupe.[44] English is now the school language of the Filipinos, just as under Spanish rule, Spanish was nominally to be learned in all the schools.[45] English is supplanting all other languages in Canada as in Dutch South Africa,[46] and the knowledge of English is spreading rapidly in India.[47] Formosa, in turn, contains a school in every local center for teaching the Japanese language to natives and native languages to Japanese.[48] Miller says that every official that he met in Bosnia and Herzegovina, no matter from what part of the monarchy, spoke the language of the people and adds: "British imports are comparatively few, and so long as British merchants continue to send their circulars in their own language and to express their prices in their own currency they will have no chance of success."[49]

In the tropics as a rule the native languages are retained. The Dutch have tried to discourage the use of their language in Java, but they expect their officials to master the native languages in the colonial training schools before going to the colonies. Therefore, the study of language, including Javanese, is much insisted on in the Civil Service appointments for the Dutch East Indies.[50]

[43] Consul Thomas H. Norton, "Language," in *U. S. Consular Reports*, September, 1907, 91.

[44] Bigelow, *Children of the Nations*, 188.

[45] Colquhoun, *Mastery of the Pacific*, 136.

[46] Bigelow, *op. cit.*, 223.

[47] Elwin, *Indian Jottings*, 152.

[48] Colquhoun, *op. cit.*, 390; *Statesman's Year-Book*, 1908, 1220.

[49] Miller, *Travels and Politics in the Near East*, 113.

[50] "Colonial Administration," in *Monthly Summary of Commerce and Finance*, October, 1901, 1337–1338.

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Likewise, under British regulations, men who pass the examination of the Eastern Cadet Service and select the Hong Kong service are sent to Canton for two years to study Chinese.[51]

Our conclusion is that in all colonies, where the language of the mother country is spoken, it is comparatively easy to establish trade relations between the governing country and its possession; and, even if the native languages in the colonies are retained, the mother country and colony are in better position from the standpoint of language than foreign country and colony to carry on trade.[52] There are, of course, exceptions to the above generalizations. It is the Italians and Spaniards and not the French who furnish the language of the white man in Algeria and Tunis.[53] The British administration in Egypt was handicapped for many years because it retained French as the official language instead of introducing English.[54] In St. Thomas English is the working language and English signs adorn the streets.[55] In Santa Cruz also, while the black policemen wear Danish helmets, their speech is English, as is that of the negro population as a whole there, and official notices bearing the name of the king of Denmark are in English.[56] The Danish policy in Greenland has greatly retarded commerce and the general development of the colony because instead of encouraging the natives to learn the Scandinavian language and thus be brought more closely in touch with Iceland, Denmark, Norway and Sweden, and civilization in general, all efforts have been made to prevent even the adoption of foreign terms; nor do the Danes learn Eskimo.[57] Again, complaints are often made that German functionaries do not try to learn the native languages, yet when self-interest in extending commerce is involved young German traders will learn even such

[51] Colquhoun, *Mastery of the Pacific*, 344.
[52] Ireland, *Far Eastern Tropics*, 25.
[53] Bigelow, *Children of the Nations*, 249.
[54] Penfield, *Present-Day Egypt*, 327–330.
[55] Bigelow, *op. cit.*, 184.
[56] Bigelow, *op. cit.*, 203.
[57] Carstensen, *Two Summers in Greenland*, 178–180

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a difficult language as the Chinese.[58] The trade of Turkey goes to other countries than England because of "the wretched education in modern languages with which most Englishmen are afflicted"—a disadvantage not suffered by German and Austrian commercial travellers.[59] China's trade with Chinese Turkestan suffers because Chinese officials either are or pretend to be ignorant of the language of the possession and as a rule employ Mohammedan interpreters.[60] On the other hand, trade is encouraged between China and Manchuria because Chinese is the working language of that colony.

Trade is influenced by *banking and monetary conditions.* It is true that with primitive peoples trade is still carried on to some extent by means of barter, but such trade is necessarily very limited in character. Business is certainly encouraged between countries having the same monetary standard, and the extension of branch banking has been of great value in furthering commerce. The banking facilities of the West Indies have had something to do with the large trade between the United States and those Islands.[61] Now, since banking interests in the colonies are usually to a large extent under the control of citizens from the mother country, trade receives another encouragement to follow the flag. These colonial banks are always of great service to the trader in the home land. If the shipper has any doubt as to the purchaser's reliability, he writes to the bank for information. If he wishes the aid of a colonial lawyer or broker, he writes to the colonial bank. If he visits the colony, he secures a letter of introduction from the home bank to the colonial one, and presents himself for advice as to the best openings in business or as to efficient methods of developing trade. That the United Kingdom, therefore, has an "Imperial banking system" which centers in London is a matter of great commercial importance. Many of the colonial banks also have branch offices in

[58] *Cf.* Wilder, "China," in *U. S. Consular Reports,* September, 1907, 76.

[59] Miller, *Travels and Politics in the Near East,* 495–496.

[60] Deasy, *In Thibet and Chinese Turkestan,* 331.

[61] *Cf.* discussion of paper by Flux, "Flag and Trade," in *Journal of Royal Statistical Society,* 62: 532.

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London with London boards of directors. The Bank of Africa, the Bank of British Columbia, the Bank of New Zealand, the Bank of Australasia, and others have their head offices in London.[62] France and other countries have a somewhat similar imperial banking system. The Comptoir National d'Escompte de Paris has agencies at various points in Madagascar, and there is also a private bank, the Banque Grenard, which draws on the Crédit Lyonnais of Paris.[63] There are at least three Dutch banks in Java, and the banks in Holland also make heavy advances to colonials, so much so that in 1885, for instance, when the Dutch colonies were suffering from the effects of the low prices of sugar and other agricultural products, the mother country narrowly escaped a financial and commercial crisis.[64] In 1903 there were ten banks in the Philippines, among which were agencies of foreign banks in India, Australia, Hong Kong and Shanghai, also some Spanish banks, but three of the ten were American banks established there since American possession. In the Austrian possessions the Banque Privilégiée de Bosnie et d'Herzégovine was created with a large capital, and the majority of the stockholders are also stockholders of the Bank Verein of Vienna.[65] After Formosa was occupied by the Japanese a branch of the Thirty-fourth Bank, which has its headquarters at Osaka, was opened at Taihoku and shortly after the Bank of Formosa was established by the Government.[66]

Common coinage regulations[67] and use are also not without influence upon trade, although of secondary importance. For example, in most of the German colonies the imperial coins have been made legal tender;[68] in Bokhara Russian paper roubles are

[62] *Cf.* Caldecott, *English Colonization and Empire,* 189.

[63] *Vid. Statesman's Year-Book,* 1904, 640.

[64] Eckstein, "How a Financial and Commercial Crisis was avoided in Holland," in *U. S. Consular Reports,* July, 1885, 420.

[65] Barré, *La Bosnie Herzégovine,* 203–204.

[66] Takekoshi, *Japanese Rule in Formosa,* 280.

[67] *Vid.* Muhleman (*Monetary Systems of the World*) on early colonial monetary conditions.

[68] Loeb, "German Colonial Fiscal System," in *Publications of American Economic Association,* 3d ser., 1: 441.

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current everywhere;[69] Japanese coinage is used in Formosa;[70] but in the Danish islands, St. Thomas and Santa Cruz, an exception again appears, as American dollars pass current and purchases are made at the rate of so many cents, not so many gulden or krone.[71]

Transportation and facilities for communication also help to determine the direction of trade. That England has lost the leading position of importer to Costa Rica, and that the United States now supplies more than half of that country's imports, is due to the superior transportation facilities of the United States.[72] In Liberia, an undeveloped country with great natural resources, there is a strong demand for American goods, but the trade between the Republic and the United States is very small because there are no direct lines of communication between the two countries. The natural advantage of the United States in South American trade (especially trade with the northern states of that continent) is largely annulled by England's superior shipping facilities.[73] Germany's success in trade has been partly due to the action of the German government in subsidizing steamship lines to all parts of the world.

Since communication facilities are often better between mother country and colonies than between colonies and foreign countries, another inducement for trade to follow the flag appears. The French steamers, for example, make good connections with the French possessions, and chiefly German vessels visit Togoland and the other German colonies. Since Japan took charge of Formosa there are six regular sailings between the colony and its governing country. Takekoshi says: "Since Formosa passed into our possession the sea routes have undergone most remarkable changes."[74] Up to the time of Japanese occupation of Formosa the carrying trade between Tamsui (Formosa) and Amoy

[69] *Statesman's Year-Book*, 1908, 1468.
[70] *Ibid.*, 1221.
[71] Bigelow, *Children of the Nations*, 203.
[72] *Cf. U. S. Monthly Consular Reports*, December, 1904, 130.
[73] *Cf.* Davidson, *Commercial Federation and Colonial Trade Policy*, 99.
[74] Takekoshi, *Japanese Rule in Formosa*, 257.

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was almost entirely monopolized by a British firm, the Douglas Steamship Company. Subsequently, owing to subsidization of Japanese lines, it is almost entirely shut out, except as it sends one or two boats to Tamsui during the tea season.[75] In 1902 there were eleven subsidized routes receiving a total subsidy of 664,209 yen.[76] The different mother countries of the West Indian islands have also paid heavy subsidies to steamers plying between the mother country and colony, and to-day this system of European subsidy continues, while from one island to another the means of intercourse are very unsatisfactory.[77]

Trade is influenced by *official attitude towards commerce.* In the British possessions and indeed in most of the other colonies it is left to individual enterprise to push the sale of goods. But French officers and civil servants receive official instructions to favor French merchants and to push the sale of French wares and this may be a reason aside from discriminating duties that Madagascar now buys more goods of France than it did before it came under French dominion.[78] The German colonial officials also do not hesitate to give practical and active assistance to German traders. Such government advertising of goods cannot be without effect.

Although it is only exceptionally that *sentiment*[79] discriminates against goods of any nationality, yet at times it may reach such a high point that it predominates in determining the origin of

[75] *Ibid.*, 257–258.

[76] *Ibid.*, 260.

[77] Bigelow, *Children of the Nations*, 305.

[78] *Cf.* Davidson, *Commercial Federation and Colonial Trade Policy*, 141.

[79] "If by the maxim trade follows the flag it must be understood that people will prefer poor and dear goods to cheaper and better goods simply because the former were manufactured under the flag, few would be found to defend it. Sentiment undoubtedly has a strong influence on trade and patriotism is one kind of sentiment. But its influence is not exerted in this simple way. Its effect is more indirect. It may alter the estimates which people place on goods. Prejudice and custom may so modify a man's tastes and inclinations that he prefers goods made under the flag. But this is because goods made under the flag are in themselves different goods from apparently similar articles made elsewhere." Davidson, *op. cit.*, 144.

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goods. It is said that during the crisis produced by Emperor William's telegram to President Kruger, goods bearing the trade mark "Made in Germany" were in many places quite unsalable. Because Germany has given support to Turkey, Turkish trade follows the German flag and not the British.[80] But sentiment is not all-powerful as societies to encourage consumers to use home products have found. Yet sentiment is often a factor in trade between mother country and colony through the operation of government expenditures, for governments are expected to encourage imperial trade whether it is the economical course or not. Nevertheless governments do not always do this but sometimes consider the taxpayer and purchase government goods in the cheapest market. Yet if any favoritism is shown it is apt to be in favor of imperial goods as compared with foreign.

To summarize: we find that factors encouraging imperial trade are colonial investments, emigration of citizens to colonies, knowledge of colonial conditions, use of a common language, common banking and monetary conditions, better transportation and facilities for communication, official attitude and sentiment. Even leaving out of account the movement of goods which is due solely to tariff regulations, there is warrant then for saying that a certain part of the trade between the mother country and the colony is due to their political relation. How much we can only conjecture. That the popular view exaggerates the amount of such trade must be admitted.

The conclusions drawn from the study of trade returns are that the commerce of the newer colonies especially is growing faster than that of the mother countries; that a large proportion of the trade of the colonies is with their respective mother countries; that viewed from the standpoint of the mother country colonial trade is insignificant as compared with foreign trade; and that the proportion of the trade of the mother country which is derived from her colonies is, as a rule, not an increasing one.

[80] *Cf.* Miller, *Travels and Politics in the Near East*, 496.

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Year.	Countries.	Imports.		Exports.	
		Per Cent. from Possessions.	Per Cent. from Foreign Countries.	Per Cent. to Possessions.	Per Cent. to Foreign Countries.
1908	United Kingdom	21.8	78.2	33.3	66.7
1905	France[81]	3.3	86.7	4.8	95.2
1908	Germany	.3	99.7	.9	99.1
1908	Netherlands	14.3	85.7	4.1	95.9
1908	Portugal	2.9	97.1	15.8	84.2
1908	Belgium	1.6	98.4	.6	99.4
1908–09	United States	6.8	93.2	3.2	96.8
1906	Denmark	1.1	98.9	1.1	98.9
1906	Japan	4.3	95.7	3.6	96.4
1904	Turkey[82]	7.5	92.5	1.7	98.3

The trade of the German colonies shows a considerable growth even in a decade.[83] The total trade of the colonies (exclusive of Kiauchau) averaged from 1892–1896 a little more than 27 million marks; in 1905 it was over 97 million marks or almost four times larger in 1905 than in the earlier period. The special trade of the mother country during the same time did not quite double. In 1908 the trade of the German colonies reached 138 million marks. The trade of Kiauchau during the period of German occupation has also been quite satisfactory. It has grown from 19 million marks in 1901 to 116 million marks in 1908,[84] or almost as much as the trade of all the other German possessions together.

The proportion of the trade of the German colonies which is with the mother country varies greatly in the different possessions. In 1902 the proportion of imports from Germany ranged from 9 per cent (West Caroline Islands) to 84 per cent (South West Africa); the proportion of exports to Germany showed

[81] Exclusive of Algeria and Tunis.

[82] Including Bulgarian trade.

[83] Trade of the German Colonies (Exclusive of Kiauchau).

Year Average.	Imports marks.	Exports marks.	Total Trade marks.
1892–1896	15,200,000	11,833,000	27,034,000
1905	69,234,000	27,837,000	97,068,000
1908	91,857,000	46,450,000	138,307,000

[84] *Statistisches Jahrbuch für das deutsche Reich.*

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equally great variations, 16 per cent (South West Africa) to 93 per cent (East Caroline Islands).[85] Taking the German possessions as a whole, the proportion of trade with the mother country is an increasing one.[86]

The German colonies make a favorable trade showing also in that the proportion of the mother country's trade which is colonial is larger than formerly. But when the colonial trade is compared with Germany's foreign trade the relative insignificance of the former becomes apparent. The trade with the colonies will have to grow a great deal before the German possessions can be regarded as of any considerable commercial importance to the Empire.[87]

The methods employed by the Germans in developing the colonies are often quite different from those used by the English and the results are correspondingly different. A comparison of German East Africa with British East Africa shows that the former colony has a series of ports and more navigable rivers than British East Africa, and probably is richer in mineral wealth; and that the Germans have spent money upon German East Africa more freely than the English have upon British East Africa. The development of the former, however, does not promise to be so rapid as that of the latter. The reason is that the British centered their energies on the construction of the Uganda Railway to open up the country while German expenditures have taken other forms, such as for palaces, fortresses, lighthouses, educa-

[85] Compiled from *ibid.*

[86] Proportion of Trade with Germany.

Year Average.	Imports per cent.	Exports per cent.	Total Trade per cent.
1892–1896	39.2	38.0	38.7
1905	67.9	58.0	65.1
1908	62.3	65.8	63.5

[87] Proportion of Germany's Special Trade with her Colonies (Exclusive of Kiauchau).

Year Average.	Imports per cent.	Exports per cent.
1892–1896	0.1	0.2
1905	0.2	0.8
1908	0.4	0.9

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tion, and so on.[88] German methods, it will be seen, do not lead so directly to trade development as do the British.

Lister in his report on the French colonies says that the "value of the Colonies to France is commercial; her conquests should be economic, and the object of her colonial policy should be not to plant offshoots of the French race in new countries . . . but to further the economic development of these countries in order to secure commercial outlets."[89] Commercial motives are becoming increasingly predominant. The French colonies in the Orient are mere commercial outposts. It is the chief aim of the administration in Indo-China to encourage trade with France. These efforts, however, have not been very successful. The leaders in the import trade are British and German, and the Chinese are chiefly in control of the export trade and domestic transactions.[90] The great natural obstacle to the development of Indo-China is the absence of navigable rivers. The Songkoi river in Tongking turned out to be worthless as a waterway. Attention therefore has been turned to railway projects. The Tongking-Yunnan line which is to traverse Yunnan, the southwestern province of China, is designed to secure the trade of Szechuan, which is a very rich and populous province of China. But there are two chief factors which promise to defeat this plan. One is that the trade of Szechuan can more easily be carried by way of the Yangtse waterway; the other is the restrictive influence of the French customs which examines everything, fails properly to close the packets, and in other ways hinders trade.[91] The development of Indo-China has been hindered most of all, however, by a defective colonial system. Tongking and Cochin-China especially are capable of development for both are very fertile countries, having great rice-growing deltas. Taken as a whole, the fertility of the French colonies comprised under the term Indo-China is very great. The principal products are rice, Indian corn, tobacco,

[88] Eliot, *East Africa Protectorate*, 256–261.

[89] Report by the Honorable Reginald Lister, His Majesty's Minister at Paris, on the French Colonies, 1–2.

[90] Morris, *History of Colonization*, 1: 454.

[91] Colquhoun, *Mastery of the Pacific*, 411–412.

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vegetables and tropical fruits. Cotton, tea, coffee and sugar are also cultivated. Coal, antimony and the precious metals are abundant. Railroads, transport lines and new industries are being rapidly introduced and the outlook for the material progress of these regions is very promising. But France must solve two great problems before these vast resources can be developed. These are the maintenance of tranquillity among the native populations and the immigration of enough Frenchmen to promote and to manage properly the proposed enterprises. The framework of success has been prepared, but so far the principal actors are still lacking.[92]

Among the French possessions Algeria and Tunis enjoy exceptional prosperity. The commerce of Algeria is largely in the hands of the French. The growth of the wine industry has been very remarkable.[93] The chief export is wine, a fact of especial interest to France since she is the greatest wine-consuming country in the world. Tunis has a better climate and richer soil than Algeria,[94] and is undergoing a great commercial development—greater even than Algeria. Still more prosperity is predicted for Tunis when the great trade route from the Mediterranean to Lake Tchad in the heart of Africa is opened up. "French influence in Africa will then receive a commercial expansion that is its due." [95]

There are two factors to be taken into consideration in order to account for the small trade of the French possessions in West Africa (Senegal, Guinea, Ivory Coast and Dahomey) as compared with the immense area of the country. In the first place, enormous districts of the French possessions are not at all fertile and produce only one marketable commodity—gum from the

[92] Morris, *History of Colonization*, 1: 454–455.

[93] THE WINE INDUSTRY IN ALGERIA.

Year.	Gallons produced.
1872	4,994,000
1880	9,504,000
1888	60,742,000
1898	100,194,600

Mansfield, *In the Land of Mosques and Minarets*, 55–56.

[94] *Cf.* Clayton, *Les colonies françaises*, 233.

[95] Mansfield, *op. cit.*, 62.

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stems of the *Acacia horrida*—and, while this gum is found in abundance, pickers are not plentiful. Labor is especially scarce since the French authorities have forbidden native raiding to secure slaves for this work. In the second place, France possesses nearly all of the regions containing the tawny Moors, a people of commercial enterprise. From the earliest historical accounts of these Moors up to the present time they have drawn the trade from the rich and fertile districts, carried it across the desert to trade with the white Moors who in turn delivered the goods to Mediterranean and Red Sea ports. But the Portuguese opened up the West Coast seaboard trade and as a result, the tawny Moors for four hundred years have been suffering from commercial wars. This accounts in part for the decay of the great towns of Timbuctoo, Jenne, Mele and others. In addition, native religious wars and strife have decreased the economic prosperity of these regions.[96]

The French colonies as a whole (exclusive of Algeria and Tunis) carry on a large proportion of their trade with France. The percentage for 1905 was 43.3. This is a falling off from 1880 when the proportion of trade with France was 53.5 per cent.[97] France's trade with the colonies does not loom up very large in comparison with French foreign trade. In 1905 it

[96] Kingsley, *West African Studies*, 235–237.

[97] TRADE OF THE FRENCH COLONIES (EXCLUSIVE OF ALGERIA AND TUNIS).

Year.	Total Imports.	Imports from France.	Per Cent.	Total Exports.	Exports to France.	Per Cent.
1880	136,048,000	51,427,000	37.8	151,502,000	102,400,058	67.6
1889	207,196,000	73,994,000	35.7	200,871,000	104,840,000	52.2
1899	345,565,000	178,119,000	51.5	310,165,000	135,753,954	43.8
1905	492,992,000	227,632,000	46.6	387,936,000	153,482,000	39.6

Year.	Total Trade, Francs.	Total Trade with France, Francs	Per Cent. with France.
1880	287,551,000	153,827,000	53.5
1889	408,067,000	178,834,000	43.8
1899	655,731,000	313,873,000	47.8
1905	880,928,000	381,115,000	43.3

Compiled from *Statistiques Coloniales pour l'année 1889*, 119, 121; *Monthly Summary of Commerce and Finance*, October, 1901, pp. 1533, 1535; and *Report by Lister on French Colonies*, 50.

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formed only four per cent of the total French trade, and this was a gain over earlier periods, for in 1880 the proportion was 1.8 per cent.[98]

Among the British colonies the self-governing possessions carry on the largest trade with the mother country in absolute amounts and in proportion to their total trade. Root[99] holds that one reason that so many of the British possessions which are not self-governing communities are in a backward condition is because there is the tendency, as in India, to regulate trade as well as finance in the interests of the governing minority instead of in the interests of those governed.

In 1908 the total imports of the United Kingdom amounted in round numbers to 593 million pounds of which the colonies contributed 130 million; the total exports were 377 million pounds in value and of this sum almost 126 million went to the colonies. The proportion of British trade with the colonies was, in 1908, 26.3 per cent. It will readily be seen that the British colonies are a much more important commercial asset than are other colonies to their respective mother countries. On the other hand the proportion of colonial trade which goes to Great Britain is less than formerly[100]—another illustration of the tendency of trade to become denationalized as a colony develops.

[98] Commerce of France.

Year.	Per cent. of imports from colonies.	Per cent. of exports to colonies.	Per cent. of total trade with colonies.
1880	2.1	1.5	1.8
1889	2.4	1.9	2.2
1899	3.0	4.3	3.6
1905	3.3	4.8	4.0

Compiled from *Statesman's Year-Book*, 1906, p. 861, and other years.

[99] *Trade Relations of the British Empire*, 201.

[100] Proportion of Trade of British Colonies with the United Kingdom.

Year.	India, Per Cent.	Self-governing Colonies, Per Cent.	Other Colonies, Per Cent.	Total Possessions, Per Cent.
		Exports.		
1867–71	52.6	55.4	46.4	52.1
1902–03	27.1	47.8	20.6	35.6
		Imports.		
1867–71	69.2	57.5	34.3	57.4
1902–03	64.2	41.4	24.9	42.5

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Belgium, or more correctly speaking, the sovereign of Belgium has profited greatly from the commercial exploitation of Congo Free State. During the five years 1897–1901 the import trade of the colony increased 4 per cent; but the export trade within the same time increased 234 per cent! Bourne[101] says:

"There have been further extensions of the *domaine privé* system, and the granting of monopolies under it, especially in the Kasai district, and the enterprise of the privileged companies old and new has certainly not slackened, although through increasing difficulties in the collection of rubber, which now constitutes in value nearly seven-eighths of all the produce exported, their profits have been notably reduced. Hence the speculative value of the shares issued by the privileged companies has, in some cases, fallen to less than half the amount reached in their palmier days. For all that, however, it was reckoned in August, 1902, that the aggregate of the shares held by the State alone in those companies might have been sold for 80,000,000 francs or nearly thrice the 28,709,000 estimated for the entire revenue of the State in 1902. The State is still a valuable asset to its Sovereign and his partners; and others besides financiers and financial gamblers have been enriched by it."

The proportion of imports into Congo Free State from Belgium was in 1901 72.3 per cent of the total imports, and in 1908 practically the same—72.4 per cent; the proportion of the exports of the colony which went to Belgium was in 1901 and in 1908 93.3 per cent and 88.7 per cent respectively.[102] The reform policy so recently adopted, through throwing the territory open to trade,[103] may in time materially reduce these proportions.

[101] Bourne, *Civilisation in Congoland*, 280.

[102] TRADE OF CONGO FREE STATE.

Year.	Total Imports, Francs.	From Belgium, Francs.	Per Cent.	Total Exports, Francs.	From Belgium, Francs.	Per Cent.
1901	23,162,000	16,716,000	72.3	50,488,000	47,065,000	93.3
1908	27,226,880	19,733,560	72.4	44,412,670	39,429,000	88.7

Compiled from *Statesman's Year-Book*.

[103] "The Belgian Minister for the Colonies, in October, 1909, indicated his scheme of reform in the Congo. The natives would be granted the

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The East coast of Africa is divided between Italy, Great Britain, Germany and Portugal. Of these four spheres the Italian is the least attractive. Italian Somaliland consists of fort-like promontories without a single blade of grass or other verdure, and sand-storms frequently envelop the whole region. There are fertile valleys in the interior however, and the products are considerable. These consist of cattle, sheep, goats, hides, ivory and various gums. The colony suffers commercially from the lack of good harbors and the coast is inaccessible a large part of the year because of the monsoon.[104] The trade of Italian Somaliland is therefore considerably less than that of Eritrea.[105]

The Portuguese possessions in East Africa are older and richer than the Italian but they are not much more highly developed. Order is not yet entirely established, slave raiding is thought still to exist, capital is lacking and the customs tariffs are unfavorable to commerce. However, they yield a considerable amount of such products as ivory, cotton, copal, rubber and various valuable drugs.[106] The exports are mainly rubber, various ores, wax and ivory. Portugal receives a goodly share of the trade.

The chief products of Portuguese Angola are coffee, rubber,

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right to take the produce of the soil in the Domain. This would be accomplished in three stages. On July 1, 1910, the Lower Congo, Stanley Pool, Ubangi, Bangali, Kwango, Kasai, Katanga, the southern portion of the Eastern Province, Aruwimi, and the banks of the river as far as Stanleyville would be open to freedom of trade. On July 1, 1911, the Domain of the Crown, and on July 1, 1912, the Welle district would also be thrown open. Furthermore, the Government would levy taxes in money and the system of provisioning the agents would be abolished. In March, 1910, various decrees ameliorating the condition of affairs were voted by the Colonial Council, regulating taxation, abolishing the exploitation of Domain land by the State in July, 1912, and abolishing the powers of the *Comité Spécial* of Katanga." *Statesman's Year-Book*, 1910, p. 646.

[104] Eliot, *East Africa Protectorate*, 248–249.

[105] TRADE OF THE ITALIAN COLONIES.

Year.		Imports lire.	Exports lire.
1907–08	Italian Somaliland	2,260,944	1,299,201
1907	Massowah, Eritrea	10,605,877	2,188,205

Statesman's Year-Book, 1910, p. 970–971.

[106] Eliot, *op. cit.*, 251.

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wax, sugar for rum distilleries, vegetable oils, cocoa-nuts, ivory, oxen and fish. Cotton growing has become unremunerative, and is now neglected; and rubber supplies are becoming exhausted. The imports into Angola consist chiefly of textiles from Germany and Great Britain. Portugal secures the larger part of the export trade which consists chiefly of coffee and rubber.

The Portuguese colonies as a whole carry on a considerable trade[107] but not a large proportion goes to Portugal, yet the colonial trade forms a mentionable part of the total Portuguese trade: in 1908, 2.9 per cent of the imports came from the colonies and 15.8 per cent of the exports went thereto. The proportion of exports sent to the colonies shows an increase over earlier periods but both the relative and the absolute amount of imports of colonial origin is less than formerly.[108] The total trade with the colonies decreased from 7.9 per cent in 1888 to 6.8 per cent in 1908.

The Spanish colony Rio Muni on the Gulf of Guinea has a low and marshy coast region and contains vast forests. There are Spanish, French and English factories along the coast but trade is hampered because there are no harbors and the rivers are not

[107] TRADE OF THE PORTUGUESE COLONIES IN 1908.

	Imports.		Exports.	
Portuguese India	5,919,000	rupees.	2,069,000	rupees.
Macao	18,697,000	Mexican dollars.	17,755,000	Mexican dollars.
Timor	311,000	milreis.	358,000	milreis.
Cape Verde Islands	2,096,000	"	355,000	"
Portuguese Guinea	857,000	"	492,000	"
S. Thome and Principe	3,185,000	"	7,921,000	"
Angola	5,137,000	"	3,730,000	"
Portuguese East Africa	7,577,000	"	5,616,000	"

Statesman's Year-Book, 1910, pp. 1114–1121.

[108] TRADE OF PORTUGAL WITH THE COLONIES.

Year.	Total Imports, Milreis.	From Colonies, Milreis.	Per Cent.	Total Exports, Milreis.	To Colonies, Milreis.	Per Cent.
1888	47,981,000	3,497,000	7.3	32,956,000	2,910,000	8.8
1908	67,257,000	1,988,000	2.9	28,462,000	4,513,000	15.8

Compiled from *Statesman's Year-Book*.

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accessible to vessels. In the Canary Islands England has the commercial lead.[109] About 80 per cent of the exports go to England and about 40 per cent of the imports are of English origin. Imports of Spanish origin in 1865 formed 12.2 per cent of the total, and in 1895 13.9 per cent.

The trade statistics of Bosnia and Herzegovina are included in those of Austria-Hungary, the two provinces having been placed in the Austro-Hungarian customs district, so that data for these possessions are not readily available. Baron von Kállay has pointed out that the imports of the occupied territory were, about 1895, with few and unimportant exceptions, from Austria-Hungary. Miller[110] says that annual reports show the truth of this statement.

Of the Danish possessions the West Indies are usually considered the most important commercially. But the trade of these islands with the mother country has for some years been falling off until it is now a very small amount. From 60 per cent to 80 per cent of their trade is with the United States. Economic conditions in Iceland have been improving until its trade with Denmark is of more importance than that either of Greenland or the West Indies.[111] The total colonial trade with the mother country is comparatively unimportant, however, as it forms only from one to two per cent of Denmark's total trade.

The Dutch East Indies are the most important of the possessions of the Netherlands. Their trade during the last thirty years has grown rapidly but the gains are not so great as in the case of

[109] *Cf.* Ruiz y Benítez de Lugo, *Islas Canarias*, 79; Brown, *Madeira and the Canary Islands*, 267–268.

[110] *Travels and Politics in the Near East*, 112.

[111] TRADE OF THE DANISH COLONIES FOR 1906.

Colony.	Imports from Denmark kroner.	Exports to Denmark kroner.
Iceland	5,322,000	4,762,000
Greenland	1,027,000	432,000
West Indies	3,000	25,000
Total	6,352,000	5,219,000

Statesman's Year-Book, 1908, p. 904.

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the mother country.[112] The leading exports are sugar, coffee, rice, tea, indigo, cinchona, tobacco and tin. About one-half of the rice exported goes to Borneo and China, but of the remaining exports nearly four-fifths go to the Netherlands.[113] During the last twenty years the proportion of Dutch exports which go to the colonies has slightly decreased on the average but the percentages for 1888 and 1898 are almost identical—4.2 and 4.1 per cent respectively. The proportion of imports of colonial origin increased during the two decades from 9.3 per cent to 14.3 per cent.

Turkey has gradually lost even her nominal hold on her possessions, and the trade of the few remaining is not of great commercial value to Turkey.[114] Egypt, the most prosperous one, receives only 9 per cent of her imports from Turkey, and sends thereto only 1.9 per cent of her exports.

Although Russia has acquired vast areas in Central Asia the desired markets for goods have not been obtained because of the scantiness and poverty of the population. Russia, of course, does not feel the need of additional markets as keenly as do the

[112] COMPARISON OF THE RATE OF GROWTH OF THE TRADE OF THE NETHERLANDS AND THE DUTCH EAST INDIES.

Year.	Imports into Netherlands, Guilders.	Percentage Basis.	Imports into Dutch East Indies, Guilders.	Percentage Basis.
1875	218,846,000	100	125,672,000	100
1907	2,692,000,000	1230	247,271,000	196
	Exports from Netherlands.		Exports from Dutch East Indies.	
1875	538,971,000	100	177,076,000	100
1907	2,212,000,000	410	364,558,000	205

[113] *Statesman's Year-Book*, 1910, p. 1050.

[114] TRADE OF THE TURKISH POSSESSION IN 1908.

	Total imports	Total exports.
Egypt	22,230,000 Egyptian pounds.	26,076,000 Egyptian pounds.
Anglo-Egyptian Soudan ..	1,892,000 Egyptian pounds.	516,000 Egyptian pounds.
Samos	26,302,000 piastres.	24,774,000 piastres.
Crete	21,071,000 drachmai.	18,372,000 drachmai

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strictly manufacturing nations, but by a system of strict protectionism the most possible has been made of all new territory acquired.[115] In Khiva, Bokhara and Turkistan cotton-raising is an important industry and is rapidly being extended. Transportation facilities have not been sufficient to carry the entire crops to market. The exports of cotton from Central Asia to Russia by way of the Caspian Sea alone amounted to over 214 million pounds in weight as early as 1900–1901.[116] Owing to the central location of Bokhara its foreign commerce is quite important and it has considerably advanced under Russian protection. Trade is principally with Russia, India and Persia, and is carried on by caravan routes and by means of the Trans-Caspian Railway. The entire foreign trade of Bokhara is estimated at 15 million dollars, of which two-thirds or 10 million dollars is with Russia.[117] Bokhara's imports of green tea, chiefly from India, are said to amount to 1,125 tons per annum. Other imports from India are indigo, Decca muslins, drugs, shawls and kincobs. Bokhara in turn exports raw silk to India in large quantities, the estimated amount for one year being 34 tons. The chief commercial products of Khiva are cotton, as mentioned above, and silk.[118] It has been suggested that the cultivation of amicable relations with Japan and China would guarantee Russia the facilities for trade and commerce[119] which are not supplied by Russian possessions.

Figures are not available to give any definite idea of the extent of the trade of China with her four possessions. It is of considerable importance, however. Chinese Turkestan carries on a heavy caravan commerce with China.[120] Russia also comes in for a share of the trade of Turkestan which is carried on in the same manner as from time immemorial. The traders carry their wares from place to place, their means of transport often

[115] Gerrare, *Greater Russia*, 308–309.
[116] *International Year Book*, 1902, p. 141.
[117] *New International Encyclopedia*, 3: 181.
[118] *Statesman's Year-Book*, 1908, p. 1467–68.
[119] Dyer, *Japan in World Politics*, 198.
[120] *New International Encyclopedia*, 16: 1011.

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being ponies. The wares of the traders consist chiefly of Russian cloths and chintzes because the Russian government pays such bounties on the export of these articles that Russian manufacturers are enabled to defy competition in Chinese Turkestan.[121] The commerce of Mongolia is almost wholly barter trade, brick tea being the chief medium of exchange. Mongolia has a considerable transit trade as it lies on the route from China to Russia. Manchuria was formerly chiefly valuable to China as a source of lumber supply but the recent development of Manchuria is giving importance to other lines of trade. Much of the trade of Tibet, like that of Mongolia, is carried on by barter. The preferred medium of exchange is the Indian rupee. The importance of Tibet as a factor in the world of commerce can only be guessed at. The commercial wealth of the country centers itself in the southern and eastern valleys. English trade with Tibet by way of India is very small and is estimated at £150,000 per annum.[122] There are no statistics available to show the value of Tibetan trade with China but estimates place the amount at not less than several million pounds.[123] The main article of commerce of Tibet, as well as of Turkestan, with the mother country is tea. The tea supplied to Tibet by Chinese tea gardens is estimated to be close to twelve million tons annually. The wealth of gold in Tibet lends importance to its trade. Holdich[124] says: "Tibet is not only rich in the ordinary acceptance of the term; she must be enormously rich—possibly richer than any country in the world. For thousands of years has gold been washed out of her surface soil by the very crudest of all crude processes and distributed abroad. Some has gone to India via Kashmir or Kumaon, some northward to Kashgar; but most of it undoubtedly has gone to fill the treasuries of Pekin. From every river which has its source in the Tibetan plateau, gold is washed." Indeed, Tibet has many products which stimulate commercial enter-

[121] Deasy, *In Thibet and Chinese Turkestan*, 342.
[122] Holdich, *Tibet, the Mysterious*, 326–327.
[123] Parker, *China*, 52.
[124] *Tibet, the Mysterious*, 329.

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prise. In southeastern Tibet silver, copper, lead, iron and mercury are all worked. Agate, borax, salt and musk also enter into Tibetan trade, while the vast forests of timber in eastern and southeastern Tibet await exploitation. Tibet, therefore, contains enough of material value to make it a commercial objective.

When Japan secured control of Formosa she also secured control of the camphor supply of the world, since the production of camphor is practically confined to Japan and Formosa. The camphor trees of Formosa cover an area of 1,500 square miles, so that although they are being felled at the rate of 10,000 trees a year, the supply at even the present rate of depletion is sufficient for a hundred years.[125] In the meantime the new system of reforestation which has been introduced will have had time to become effective. But unfortunately camphor can only be obtained when peace conditions exist. As soon as trouble occurs between the savages and the Formosans the industry is brought to a standstill. And over one half of Formosa is in the hands of savages who occupy the great timber belt containing the valuable camphor trees. The country can not be developed until these savage districts are opened up.[126] At the present rate of subjugation it will be many years before the savages are under sufficient control to allow their territory to be safely exploited. Other hindrances to the development of the camphor industry are the need of roads through the jungles to render the camphor trees accessible, the unsanitary conditions throughout much of this territory which greatly reduce the efficiency of the labor employed, and the unwillingness of coolies to engage in the industry owing to the dangers of attack from head-hunting tribes.

[125] Consul Arnold of Tamsui reports as the result of an interview with the chief of the camphor bureau of the Formosa government that, "Although investigations as to the number of old trees in the island are not as yet completed, the number of trees is far less than investigations a few years ago made it appear. Recent investigations warrant the statement that the supply of old trees will at the present rate of cutting, become exhausted in less than fifty years." *U. S. Consular Reports,* August 1907, p. 154–155.

[126] Takekoshi, *Japanese Rule in Formosa,* 172–182.

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Only a few years ago Formosan trade was chiefly with China but an increasing proportion is with Japan. In 1908 Formosa sent 27.7 per cent of its exports to Japan, and received therefrom 56.5 per cent of its imports; in 1898 the percentages were 25 per cent and 20 per cent respectively. In 1906 Japan derived 4.3 per cent of its total imports from Formosa and sent 3.6 per cent of its exports to that island.[127] Japan has certainly had good success in diverting Formosan trade to Japan.

The work of developing Korea is already begun. It is found that the Korean climate and soil are adapted to the raising of cotton and the future of the cotton industry in that country is full of promise.[128] Japan already receives a large proportion of the trade of this possession and can scarcely hope for gains in percentages even after the country is more highly developed, since Korea in 1908 sent 77 per cent of its exports to Japan and received 59 per cent of its imports from the islands.[129]

In the fiscal year 1908–09 the trade of the American possessions composed 4.1 per cent of the total trade of the United States. The imports from the colonies (Porto Rico, Hawaii, Alaska and the Philippines) amounted to 6.8 per cent of the total imports, and the exports to the possessions were 3.2 per cent of the total.[130] The trade of the American colonies, like that of many of the colonies of other countries, makes its best showing in the proportion of their trade which is with the mother country. In 1908–09 the proportion of imports from the mother country was 16.1 per cent for the Philippines, 81.1 per cent for Hawaii, 88.8

[127] On the progress of Japanese trade compare Stead, *Great Japan*, 205.

[128] *U. S. Consular Reports*, July, 1908, p. 116.

[129] Ladd, "Japan's Administration in Korea," in *China and the Far East*, ed. by Blakeslee, 409.

[130] TRADE OF THE UNITED STATES WITH THE POSSESSIONS.

	Imports from	Exports to
Philippines	$ 9,433,986	$11,189,441
Alaska	13,055,355	17,186,445
Hawaii	40,437,352	584,152
Porto Rico	26,391,338	23,272,170
Total	$89,318,031	$52,232,208

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per cent for Porto Rico; the proportion of the total exports sent to the United States was 32.3 for the Philippines, 98.5 per cent for Hawaii, 86.9 per cent for Porto Rico.

In considering the value of colonies as markets for goods, not only present but prospective trade must be taken into account. There is every reason to believe that the settlement colonies will continue to prosper as they have done in the past. Interest then centers around the tropical countries. Under present conditions some sort of control of the tropics is inevitable.[131] Although it is being found that articles such as sugar, which were formerly confined to the tropics, may now be produced in the temperate regions, the temperate zones are becoming increasingly dependent upon the tropics for raw materials and food products. Owing to this fact trade with the tropical regions is of great importance to the temperate zone countries. Gerrare maintains that the desire to control a base for tropical supplies is at the bottom of Russia's imperialistic ambitions. He says:

"Since Russia has attempted industrialism she feels the need all manufacturing nations have experienced of securing tropical produce which she can convert into goods, and of extending her markets amongst those who purchase such finished wares as she can supply. The first is the most pressing. England has India and other tropical possessions; Belgium has the Congo; France, Tonkin; Germany, parts of Africa, Papua and Borneo. . . . Without such properties no purely manufacturing community can compete successfully in the world's markets, and the necessity of possessing some such territory has forced itself upon modern Russia.[132]

"This is the real ground for apprehension Anglo-Saxons have in regard to India. Had Russia tropical possessions she would not be so jealous as she is of Britain's hold upon that country. She has approached Abyssinia. The existence there of co-religionists afforded an excuse and that act also shows the potency

[131] *Cf.* Giddings, *Democracy and Empire*, 284.

[132] This desire is doubtless an important factor but the writer would not lay the stress upon it that Gerrare does.

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of the idealistic policy. The real quest was tropical produce and in order to obtain a supply from a source she can absolutely control, she looks now upon Persia, Arabia and southern Asia much further east, as possible future possessions."[133]

But even after the tropical territory is secured it requires time to develop it. In German textile manufacturing circles, for example, it is greatly desired that a larger quantity of cotton be raised in the German colonies and the manufacturers of musical instruments express the wish that instead of being dependent upon foreign woods the German-African colonies which are known to contain woods of the desired varieties might be more thoroughly exploited.[134]

Although giving due recognition to the importance of the tropics as a source of supply for raw materials and food products the question still remains as to whether this interzonal trade will, from the economic standpoint, justify the acquisition of tropical colonies. The London *Economist* says:[135]

"The *Economist* has never been able to believe entirely in what may be called the plantation theory of colonization. . . . It is very doubtful whether the trade of any uncivilized region in the tropics, especially if inhabited by naked negroes, is worth the expense involved in its conquest, garrison and gradual reduction to industrial order, and quite certain that the trade will not be valuable for many years after settlement. All the articles which such negroes export can be obtained by dealers without conquering them and in most cases they fail to buy sufficient of our goods to pay the expenses which their subjugation entails. Uganda, for example, will not pay for itself in twenty years, and it is questionable whether the whole of East Africa will not be for at least a generation a losing concern."

There are certainly many obstacles to be overcome before tropical trade can be developed to any extent. In the first place, the products of a tropical region often are confined almost exclu-

[133] Gerrare, *Greater Russia*, 308.

[134] *Cf.* Consul C. B. Hurst in *U. S. Consular Reports*, January, 1908, p. 156.

[135] 1898, p. 306.

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sively to one article and if the market for that commodity is disturbed or lost the whole colony is thrown into demoralization. A familiar example is the distress of the West Indies incident to the competition of beet sugar with cane sugar. The West Indian planters had counted upon the price of sugar always remaining high, and business economies were not practised. When the price of sugar fell, they were not in a position to meet the new situation brought about by the bounties to beet-root sugar on the continent of Europe. The planters mortgaged their estates, yet did not introduce new machinery or other economies, but merely waited for a change of luck to improve the situation.[136] Again, for more than a half century the prosperity of Ceylon has been dependent upon the development of two leading products—coffee and tea. From 1837 to 1867 attention was directed almost wholly to the cultivation of coffee. The profits from the industry were almost fabulous in amount. The year of greatest export was 1874–1875, when almost one million hundredweight of coffee was shipped from Ceylon. But a sudden and severe decline in the industry set in owing to a parasitic growth on the leaf of the coffee plant. In ten years the coffee fields were desolated. In 1886–1887 only 150,000 hundredweight was sent to the London market. Between the withered rows of shrubs tea was planted and the new industry developed rapidly,[137] but the prosperity of Ceylon still rests upon one product. To cite another example, the exports of British North Borneo are quite typical. The list is quite an extensive one—tobacco, timber, cutch, gutta-percha, sago, rattans, india-rubber, birds'-nests, camphor, trepang, salt fish, damar, hempseed, pearls, mixed shell and copra. But the only things to be regarded of any considerable commercial value are tobacco and timber. The rest are merely jungle produce, and they are chiefly absorbed by the Chinese who depend upon the Dyaks to secure the rattans, birds'-nests and so forth for them. It is not a trade that admits of any great expansion without producing a scarcity of the articles in question.[138] In South America

[136] Bigelow, *Children of the Nations*, 188.

[137] Greswell, *British Colonisation*, 232–235.

[138] Colquhoun, *Mastery of the Pacific*, 280–281.

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gold and silver proved the ruin of Spain, sugar played the same part in Cuba, and in the Dutch Indies spices were the origin of trouble.[139] Morris says:

"In the work of colonization, every nation undertaking the task seems to single out some article of production as the object around which its care and solicitude turn; it is *the* commodity from which wealth is anticipated; all else is subordinated to it and, as compared with it, considered valueless. The government, zealous to promote the single coveted specialty, surrounds its cultivation or extraction with detailed regulations, retains an exclusive control over it, and expects to derive from it an exaggerated profit. Generally the hopes so highly strung are vain and deceptive. A great output may be attained, vast fortunes made, immense revenues raised, a monopoly established, glory and magnificence may ensue; but invariably, like the golden apple so beautiful to the eye, this success is corroding the heart, corrupting the character, and implanting in the national constitution the germs of senility, decay, and decline."

To overcome this difficulty of a one-product system England, Netherlands and, in more recent years, France and Germany have taken some steps toward a systematic study of colonial conditions with a view to improving agricultural methods and encouraging variations in crops. But a considerable period of time must elapse before these efforts bear much fruit.

The second obstacle to the development of tropical and indeed of all colonial trade is the scarcity of capital for investment as compared with the needs of the colonies. Production in Portuguese Angola is greatly impeded by lack of communication. The crying need of the German colonies is also for more railroads. The French colonies will require a great deal more money expended in transportation facilities before any great results in trade can be expected. "What Tunisia needs is capital, and everybody knows it."[140] The French, it is sometimes said, lack patience in waiting for results and desire to profit immediately

[139] Morris, *History of Colonization*, 1: 325.

[140] Mansfield, *In the Land of Mosques and Minarets*, 69.

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by colonial trade. Yet there is some truth in the English charge that the French would rather that their colonies would remain undeveloped than have them developed by other trade than their own. The English, on the other hand, believe that if their colonies prosper the mother country will get her share of the benefits.

The third obstacle to the development of tropical commerce is more difficult to surmount than the two just mentioned. It is the lack of a reliable labor supply. Authorities differ greatly as to the difficulties in the way of the solution of this problem. The importance of the question none deny. The economic history of the tropics for the last two or three centuries is chiefly an account of the efforts of landowners to secure an adequate labor supply. Since the abolition of slavery the sources of labor have been free negroes and imported laborers, chiefly Chinese and East Indians. Theoretically there are four possible sources of labor supply for the tropics: white, negro, East Indian and Chinese. Yet until the white man gives more promise of being able to live even a quiet and nonstrenuous life in the tropics, it is of little use to consider him as a possible source of labor supply in developing tropical colonies.[141] Ireland says that in "no part of the tropics can manual labor be performed by white men, and it has always been found that, in places where the laboring classes are composed of colored men, only the very highest occupations will be taken up by white men. A natural limit is thus set to the proportion of white men which can be supported by any community in the tropics."[142] According to Bigelow the white man has never shown any great taste for arduous manual labor in the tropics, yet one reason why he has not attempted this is the simple one that his services have had a greater economic value if devoted to the superintendence of black labor than if he attempted the heavier work. White sailors, he says, keep on with their work in the tropics the same as in cooler climates and "soldiers fight as well in India as in Northern China." The excessive mortality

[141] *Cf.* Ireland, *China and the Powers*, 15.
[142] Ireland, *Far Eastern Tropics*, 17.

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in hot climates among white troops, he claims, generally is caused by bad habits of living, the inexperience of the officers and the generally unsanitary conditions of the country and not by the heat.[143] The most convincing evidence that the white man cannot hope to become acclimated to the tropics is presented by Woodruff in *Effects of Tropical Light on White Men,* in which he shows that the white man is gradually but surely eliminated under excessive stimulation of light.

Turning to the free blacks as a possible source of labor supply, experience teaches that for the most part they have proved unreliable.[144] Frequently it is said that native labor would be adequate "if properly encouraged." In British East Africa it is claimed that where the settler is fair and just in his dealings he has little or no trouble in securing labor.[145] The division of land into small holdings is also frequently beneficial in stimulating the native to work. The complaints of labor scarcity come chiefly from large plantations. This shows that the primitive man, like the average person, prefers to be his own master. It was hoped that education would stimulate native labor, but it has been found in the tropics that where education, other than technical or industrial, has been most freely provided, natives are least inclined to work.[146] It is believed by some that the development of communication and transportation will do much to remove labor difficulties, because it will render the colonies more prosperous and greater inducements in the way of pay will make the natives more willing to work. Increase in remuneration is the normal way of stimulating labor. Even a native recognizes the difference between working for something and working for nothing. Yet to offset this advantage it often happens that when wages are doubled native laborers instead of showing a greater willingness to work reduce their labor-time by half.[147] Ireland holds that, except in countries where pressure of population is

[143] Bigelow, *Children of the Nations,* 293.
[144] Ireland, *China and the Powers,* 14–15.
[145] Eliot, *East Africa Protectorate,* 50.
[146] Ireland, *Far Eastern Tropics,* 136–137.
[147] *Ibid.*

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felt, the natives will not devote themselves to steady labor of any kind. The importance of this generalization, if true, is realized when it is considered that outside of India, Java, Barbados, Cuba, Porto Rico and a few islands of small importance, the pressure of population is not felt and the native can secure the means to satisfy his few wants with very little effort.[148]

Sometimes it is the conditions of labor rather than aversion to labor as such that discourages native efforts. One reason why it has been so difficult to secure reliable and cheap black labor in Delagoa in spite of the fact that the natives are anxious to earn wages is because of the enforced conscription practice peculiar to the Portuguese. The Portuguese indeed are feared more than the Boers.[149] The following authoritative view is well worth considering: "The core of most problems connected with the opening up of Africa is cheap labor. The negro, as compared to the European and Asiatic, is fitful in industry. He can put fire, energy, strength, skill, intelligence, into his work if he is in the mood, if he is attracted by an immediate, tangible reward, or is spurred on (as he can be so easily, poor soul!) by affection or admiration for the white man. But work for work's sake in his—to him—delicious climate and well-provided country is no ideal at present native to negro Africa. And then he has been so often cheated. He has been the butt and the prey of the shrewd Caucasian since the uprising of Semiticized Egypt eighty centuries ago and down to the last rogueries of South African mine managers. But he *will* work—and none better—if you take him into partnership, convince him of your honesty and treat him fairly."[150]

But it would take time to build up a native labor supply even on the hypothesis that the natives would respond to an increase in pay and more favorable conditions of work, and capitalists are usually impatient to establish industries and greedy to secure returns on their investments. The tendency is to seize upon forced

[148] *Ibid.*, 133–134.
[149] Bigelow, *White Man's Africa*, 52.
[150] Sir Harry Johnston, *George Grenfell and the Congo*, 1: 486.

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native labor or, more recently, imported labor as the solution of the problem. Owing to the increased facilities for communication and transportation labor is more mobile than ever before. It is not improper to speak of a cosmopolitan labor supply, much as we now speak with regard to capital, of a cosmopolitan loan fund. The supply of East Indian coolies is practically unlimited and they have enough confidence in the British government to induce them to set out for the most distant plantations provided they sail under the British flag.[151] The Chinese furnish another and equally abundant supply of labor for colonial purposes. The Chinaman shows the capacity and readiness to take the place of the negro and the capacity to fill any position from coal-heaver to banker.[151] But there are difficulties in the way of importing labor. In the first place the imported laborer may compete with the white man and cause endless trouble. We have seen the steps taken by the Australians against the admission of natives of India to their country. In the second place, the imported laborer tends to displace the native and causes new problems to arise. Colquhoun says:

"On the one hand we have lands waiting for the labourer, we have whole islands lying fallow for want of hands to till them, we have minerals waiting to be exploited. On the other hand we have the omnipresent Chinaman, ready to swarm into these lands. It seems an extremely simple situation, but mark the complications. In some of these countries white men cannot work. Well and good! The Chinese will work under his supervision, but—the ever present 'but'—there is already a native population, who ought not to be jostled out of their place on the land as the Chinese will inevitably jostle them. In others the white man can do a certain amount of work, and here he finds that the Chinese undersell him."[152]

The more closely one studies the labor situation the more is he impressed with its complications and the less optimistic does he become of an immediate solution which will give any great im-

[151] Bigelow, *Children of the Nations*, 308–309.
[152] Colquhoun, *Mastery of the Pacific*, 308–309.

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petus to the commercial development of the tropical colonies. The practical question then is, Will the native peoples, taking them as we now find them, prove good customers for American and European goods in particular? Ireland says:

"A moment's reflection serves to satisfy us that whatever increase may be looked for in the trade of the European countries, of North America, and of non-tropical Australasia, a vastly greater proportional development may be expected in the trade of tropical and sub-tropical countries. The white man at home has reached such a high degree of efficiency as a producer and as a consumer that it cannot be foreseen that the rate of progress to be observed during the past century will be maintained during the century upon which we have just entered. The people of the tropics, on the other hand, are still in a very low stage of productive efficiency; and their value as consumers is proportionately small. I have shown elsewhere (*Trop. Col.*, 110, 111) that in the British Empire the productive efficiency of the tropical as compared with the non-tropical man is as 1 to 23, and that the value of the former as a consumer is as 1 to 17 compared with the value of the latter. It is certain, moreover, that in the tropics outside the British Empire—under less efficient forms of government, and with less protection for the products of industry—the economic value of the tropical man is even less than this.

"Concisely, the formula which I would deduce from the above facts is this: that the difference between actual and normally potential economic efficiency is so much greater in the tropical man than in the non-tropical man that it is reasonable to anticipate that the trade of the former could be doubled in the time which would be required to raise the trade of the latter by thirty per cent."[153]

Tucker[154] gives an interesting account of the effects of the construction of the Uganda Railway and the establishing of steamship lines on Victoria Nyanza, chief of which was "the way in which the whole of the Lake region of Central Africa has been aroused

[153] Ireland, *China and the Powers*, 8–9.

[154] Tucker, *Eighteen Years in Uganda and East Africa*, 2: 292.

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from its age-long slumber and electrified into life and action." "From regions round about Tanganyika on to Tabora, and away westward to the Congo State, the whole population has been aroused, and, just as in Uganda, streams of men are making their way to the nearest port on the Lake shore with their produce—bees-wax, hides, goat-skins, cotton, and rubber." Tucker also states that the enlarged market for native products has resulted in a considerable rise in the standard of living in Uganda. "The Kanzu, a long white linen garment, has, in the case of the men, taken the place of the . . . national dress, . . . lamp oil has become almost a necessity for all save the very poorest. Plates and dishes, cups and saucers, pots and pans, and enamelled ware of all kinds, find ready buyers. Lamps, watches, clocks, and even bicycles are being purchased to no inconsiderable extent by natives where enterprise in cultivating cotton and other produce has been rewarded with success."[155] It is generally found, however, that natives buy chiefly ornaments, calicoes, prints, and the cheapest classes of goods, and after these simple wants are satisfied it is very difficult to raise their standard of life. Colquhoun's account of trade in the Pacific is typical: "The civilised Malays dress in cotton, but they are not a spending people, and the wilder tribes do not trouble about costume at all, or wear merely the native manufacture. They do not want furniture, for their houses are empty, and a grass-mat is all they need for bed, table, or chair. Their one extravagance is jewellery, and this they buy, cheap and nasty, from the Chinese traders, who get it, cheaper still, from Birmingham or 'Made in Germany.'"[156] The conservatism of primitive peoples also works against raising their standard of living or changing established tastes. For example, Chinese brick tea, the refuse of the tea industry, is the universal drink in Tibet and neither Bhutia, Tibetan, or Tartar will use any other in spite of the strenuous efforts of traders to introduce the tea of civilization into these vast tea-consuming areas.[157]

[155] Tucker, *op. cit.*, 293.
[156] Colquhoun, *Mastery of the Pacific*, 281.
[157] Holdich, *Tibet, the Mysterious*, 139–140.

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Another difficulty in the way of increasing native trade is the fact that most natives want what the government does not care to furnish them, firearms and spirits. The decline of native races from the use of intoxicants is a fact that must be reckoned with from whatever standpoint the future of the tropics is regarded. "It matters not at what end or part of the scale of colour the man may be—whether he is a woolly-haired, baboon-jawed nigger from Central Africa, a grave, intelligent, educated Maori of New Zealand, or a gentle child-like native of Tahiti, barely *cafe-au-lait* as to colour—all the same, and all the time, spirits are sure to convert him, temporarily, into a raging beast, and, in the long run, to wipe out him and his kind altogether."[158] Lorenzo Marques in Portuguese East Africa with its population of 1,200 whites has supported ninety drinking shops, a feat that could only be accomplished by the aid of native patronage chiefly.[159] According to Nevinson the whole population of Angola is degenerating, the people becoming bloated and stupid, and the saying common, "You see no fine old men now." This condition is likely to remain unchanged so long as the Portuguese find that rum plantations of cane or sweet potatoes pay better than others.[160] The liquor laws in Tahiti under French rule are also defective and a further impetus is thereby given to the decline of the native population—an encouragement that is not at all needed since there is already a pronounced tendency among the people of almost every island in the Pacific to diminish in numbers.[161] British East Africa and Uganda lie within the zones in which the importation of spirituous liquors is forbidden and the restrictions are very well enforced as far as European beverages are concerned, but the natives manufacture many intoxicating liquors from such things as palms, sugar-cane, and honey.[162]

In the discussions on colonial trade in general, a point seldom

[158] Grimshaw, *In the Strange South Seas*, 22.
[159] Bigelow, *White Man's Africa*, 67–68.
[160] Nevinson, *A Modern Slavery*, 145–146.
[161] Grimshaw, *In the Strange South Seas*, 23.
[162] Eliot, *East Africa Protectorate*, 182.

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touched upon is the fact that after the mother country has built up a large trade with her colonies, no assurance can be given her that she will retain the advantage. The trade of the world is ever in a tumultuously dynamic condition. So delicate are the adjustments, events of seeming insignificance may cause great shiftings in the currents of commerce. (1) The disturbance may be brought about by a cheapening of transportation, its greater efficiency, or by the opening up of new routes. The opening up of the Suez canal not only disturbed trade in Syria and adjoining countries but caused a world readjustment.[163] Similar results may be expected from the opening of the Panama canal.[164] (2) Discoveries and inventions may cause a new product to displace an old and staple one and thus upset established trade arrangements. Yucatan has discovered a plant which is said to make as good rope as now comes from Manila. Liquid fuel, a residue from the petroleum wells of Netherlands India, is now being used by many Dutch steamers.[165] During the phylloxera period in France the taste of the consumer had changed and an invention of a manufactured product broke into the sale of French wines. (3) Changes in the area of crop culture, which cause shiftings of trade, are occurring continuously. During the French phylloxera troubles, vine-growing was started or developed in Italy, Spain, Hungary, southern Russia and Algeria.[166] Tobacco is being raised in Europe to prevent European dependence upon the United States. Tea is being tried in Texas and Mexico. Cocoa plants are being grown in Samoa. The United States is cultivating the silk worm instead of leaving the industry to the Orient. The United States in turn must, in the future, face an active competition in the cotton trade of the world. German colonial enterprise in the cotton trade is meeting with good success so that Togoland and German East Africa

[163] *Cf.* Guy, "French Colonial Expansion in the Nineteenth Century," in *International Monthly*, 4: 516–517.

[164] *Cf.* Masuda, *Japan*, 122; *U. S. Monthly Consular Reports*, February, 1905, 137.

[165] *U. S. Monthly Consular Reports*, February, 1905, 54.

[166] Lebon, "The Situation of France in International Commerce," in *International Monthly*, 3: 257.

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may now be considered cotton-growing colonies. England, France, Italy and Belgium have followed Germany's example. Lately Portugal, Spain and the Netherlands have begun cotton culture.[167] (4) The industries upon which the imperial trade is built up may experience a decline. Many examples of such cases might be given. To-day Madagascar is half-ruined because of the exhaustion of the soil[168] and commerce must suffer in consequence. The camphor trade of Formosa was very valuable at one time but, under a short-sighted policy, it was farmed out; this led to the employment of wasteful and injudicious methods whereby the trees were so damaged that the amount of camphor obtained was almost nothing.[169] In Fiji the cultivation of coffee has been almost entirely abandoned owing to the attacks of a little insect called the *Acarus coffeae,* which destroyed the leaves.[170] The cotton and indigo industries, for which the West Indian island of Tobago was once famed, have disappeared.[171] In the Madeira Islands sugar was at one time the most important industry; then in 1775 the wine trade occupied first place.[172] In the Canary Islands the cochineal industry suffered from competition with aniline dyes and exports of cochineal fell from £789,993 in 1869 to £50,877 in 1892.[173] (5) Competitors may appear in the field strong enough to wrest the colonial trade from the mother country in spite of the latter's position of vantage. For a century the Portuguese enjoyed a monopoly of the rich trade with the East Indies but in 1595 a Dutch ship appeared on the scene and the monopoly was broken. England has long monopolized markets in China, especially along the line of cotton manufactures, but now the Japanese show a strong tendency to encroach upon this field. And Japanese rivals are not to be considered lightly judging from their success in wresting from Eng-

[167] "Cotton Culture in German Colonies," in *U. S. Monthly Consular Reports,* December, 1904, 103.

[168] Seignobos, *Contemporary Civilization,* 363.

[169] Colquhoun, *Mastery of the Pacific,* 394.

[170] Greswell, *British Colonisation,* 226–227.

[171] *Ibid.,* 15.

[172] Brown, *Madeira and the Canary Islands,* 268.

[173] *Ibid.,* 278–280, 266.

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land her carrying trade in Asiatic waters. Recently the chairman of directors of the Peninsular and Oriental Steam Navigation Company at the London meeting announced that there would be no dividend for the year just past because of Japanese competition—an announcement which is "pregnant with meaning and prophetic of greater changes yet to come."[174] When China emerges from the darkness the chances are that she will demand a share of the markets of the world and even take possession of much additional territory.[175] All this simply means that no trade, whether it be between the mother country and her colonies or between two foreign countries, can be regarded as a certain factor upon which reliance can be placed for estimating the value of trade in the future.

There is also reason to believe that the proportion of imperialistic trade which is due to political relations decreases as the colony becomes older. The knowledge of world conditions is continually becoming more diffused on account of faster, cheaper, and more efficient transportation which brings all countries into closer relations with each other. The result is that the sentiment regarding the security of a particular flag is becoming less and capital is becoming denationalized. Aside from this, as a colony becomes more prosperous and more secure, foreign capital and foreign trade is attracted to it. Then the need for large governmental investments decreases as a colony is developed and trade shrinks accordingly. The tropical and sub-tropical colonies are so largely unfit for settlement that, after the first opening up of a colony during which period officers are installed and traders flock in, there is little growth of white population to be anticipated and therefore trade is not encouraged to follow the citizen. The community of tastes which tends to confine trade to the mother country is also of waning importance. The increase of trade occurs chiefly, not in articles in which tastes differ, but rather in standardized articles such as wheat, cotton, wool, gold, oil, calicoes, yarns and fruit.[176] Besides as a colony becomes

[174] Allen, *Things Korean*, 254–255.

[175] Jack, *Back Blocks of China*, 257.

[176] *Cf.* Caldecott, *English Colonization and Empire*, 187.

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older *l'esprit colonial* always develops, and less and less regard is given to the origin of goods and more attention is paid to the adaptability of goods to needs. While the original settlers in a colony may be supplied by the mother country, succeeding generations are born in the new country and the sentiment which turns trade to one's native land is now lacking between mother country and colony. "When colonies were peopled by emigrants from home there was no occasion to create sentiments on imperial lines, the colonist was an Englishman and had no more need to proclaim the fact than the man in Cornwall. His descendants, however, are not Englishmen, they are Australians, Canadians, South Africans, or whatever the colony may be, with essentially different interests. A stream of fresh emigrants serves to preserve something of the Old Country sentiment, but the native-born Australian is Australian, reared under a different climate and different conditions." [177]

If colonies are successful, a disadvantage may arise in the competition between the mother country and her possessions, for every new area developed means either a new market for goods or a new competitor in the field. The French colonies have been greatly antagonized by the French protectionists whenever the colonies have begun to compete with France. A few years ago the Indo-China bank assisted in establishing spinning and weaving mills in Pondicherry, Indo-China. The sentiment of at least a part of the French people was voiced by a journal, the *République Française*, thus: "We place the prosperity of France above that of Pondicherry. If France has sacrificed so many men and so much money in the conquest of Indo-China and Madagascar it was not to procure a market for yarns and stuffs manufactured at Pondicherry." [178] France has therefore adopted custom house measures to tax French products manufactured in Indo-China and Madagascar.[179] French agriculturists are also bitter against

[177] Jane, *Heresies of Sea Power*, 181.

[178] Cited by *Economist* (London), 1898, p. 1659.

[179] *Cf.* Lebon, "The Situation of France in International Commerce," in *International Monthly*, 3: 269.

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the colonies when they come into competition with them. Large sums are spent for salted and preserved meats for the army and agriculturists desire that this shall all be spent for French products and not colonial. This sentiment was voiced by a deputy who said that it was never intended that French farmers who paid the greater part of the taxes should be sacrificed to the interests of a few speculators in the colonies.

Naturally, the older the colony the more likely is it to compete with the governing nation. The older British colonies, especially Canada, are beginning to develop considerable skill in manufacturing. It was the textile manufacturers in the Dominion that offered the strongest resistance to a preferential tariff in favor of the mother country.[180] The Colonial and Indian Exhibition of 1886 revealed, at that early date, very surprising ambitions in the direction of manufacturing. Although the English colonies contain millions and millions of acres of unoccupied land, they furnished at this exhibition great displays of samples of home-manufactured clothes, hosiery, machinery and billiard tables. The desire of the colonies to foster home manufactures is shown by their tariff schedules. Every responsible colony but one (New South Wales) has a more or less severe tariff. In Victoria, not only are watches and clocks taxed, but such essentials as agricultural machinery, hansom cabs, waggonettes, buggies, medicines, silk manufactures, articles of apparel and coal. The Representative and the Crown colonies are under imperial control, and for this reason have been prevented from adopting any protective measures. India, for example, has not been allowed to protect her own cotton goods against Lancashire although some maintain that it is England's duty to regard India's needs.[181]

[180] Root, *Trade Relations of the British Empire*, 46.

[181] Caldecott, *English Colonization and Empire*, 180–181; *cf.* Kirkpatrick, "Supplementary Chapter," in Caldecott, *op. cit.*, 283.

In 1894 when the Indian customs tariffs were revised "a small duty was imposed on (among other goods) the cotton goods imported into India. No countervailing excise duties were imposed by the Indian Government on cotton fabrics or on cotton yarns of a lower 'count' than 'twenties'—the Indian mills mostly manufacturing yarns of low counts.

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India, nevertheless, is becoming a more and more formidable rival to Lancashire. During the past twenty-five years she has been passing through the first stages of an industrial revolution. The construction of railways and the resultant opening up of the interior, the removal of export duties and the improvement of ocean navigation have greatly increased the production and exportation of cotton yarn and calico. Although Indian labor is inefficient, this is off-set by its cheapness. To-day "Bombay is no longer merely the gate of the golden East, the land of gems, drugs and spices: she is a busy manufacturing city, bristling with smoky chimneys."[182] In 1907 the first attempt was made to establish iron and steel works in British India. The enterprise, with a capital of $7,725,000, was supported by a rich firm in Bombay, aided by other wealthy individuals, and by the Government of India.[183]

An imperialistic policy involves economic loss to a country in that the collision of national interests resulting makes it more difficult than it would otherwise be for the countries concerned to enter into friendly trade or other relations with foreign nations. It is the British occupation of Egypt that has made the disputes

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An agitation was immediately set on foot by the Lancashire mill interest, as was only natural, in England, where the ultimate political power with respect to India rests. It was asserted that unless the countervailing excise was imposed, a sort of bounty would be created in favour of the Indian mills as against Lancashire, which would be against the declared policy of free trade pursued by the Government. The countervailing excise duties were therefore imposed, but they do not apply to the hand-weaving industry. Now it is contended by the Indian mill interest ... . that the Indian mills do not really compete with the Lancashire mills in the classes of goods produced. It is estimated that only one-fifth to one-sixth of the yarn produced in Indian mills is of counts above the 'twenties,' while only one-eightieth of the yarn imported from the United Kingdom was 'twenties' and under. Thus the products of the Lancashire mills and the Indian mills do not compete to any great extent. . . . In such matters, however, the hands of the Indian Government are tied by the influences that rule in the political atmosphere in the centre of the Empire." Yusuf-Ali, *Life and Labour in India*, 169–170.

[182] Kirkpatrick, *op. cit.*, 283.

[183] *U. S. Monthly Consular Reports*, December, 1907, 156–157.

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between the French and the English over the Newfoundland fisheries so hard to adjust.[184] French occupation of Tunis accounts for seventy-five per cent of the Italian's animosity toward the French.[185] Giddings, on the other hand, holds that the possession of territory may be an entering wedge for securing enlarged trade opportunities in a given region. He says:[186]

"The demand for liberal trade opportunities in the East will not be respected by China and her great overlord, Russia, merely because we are able to show her how valuable such privileges have been and may become to them and to ourselves. They will think of us as our protectionists have thought of them and of Europe—as a people afar off: and they will yield a more attentive ear to powers that, in delusive perspective, seem to be more important because they are nearer. All history points to the conclusion that in no way can we make our demand for greater trade facilities in the East so effective as by maintaining our sovereignty over some territory, however small, in that quarter of the world. If we have possessions there, if we have difficulties and responsibilities to meet there, our own attention will not be withdrawn from the opportunities there offered; and the Oriental powers will not themselves forget our existence and our resources. In short, unless we are prepared to see the Oriental trade that we now enjoy slip out of our hands, and unless we are oblivious to the possibilities of its increase, we probably must retain possession of some territory in the Western Pacific."

Finally, is it necessary to annex territory to secure the markets of that territory? Free trade economists who distinguish between a territorial empire and a trade empire answer the question in the negative. It is true that nations, as we have seen, are becoming increasingly dependent upon the tropics for supplies, but such trade does not confine itself to the mother country and possession. Outside countries get a share also. The tropical

[184] Greswell, *British Colonisation*, 56.
[185] Mansfield, *In the Land of Mosques and Minarets*, 59.
[186] Giddings, *Democracy and Empire*, 283.

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and other regions will be developed if stability of government is assured that capital may safely invest. It is of small moment to the commercial world what nation plays the part of policeman so long as a good job of policing is done. The present colonial trade situation may be summarized in this way: "On the whole Adam Smith's dictum that while each nation has managed to engross the inconveniences of a colonial empire, the advantages it has been compelled to share with the whole world, is just as true to-day as it was in the century before his time. New colonies founded to expand trade buy as largely from foreign nations as from the mother countries, while the imperial expenditures on them and in them often exceed the sum total of all their trade."[187]

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[187] Davidson, *Commercial Federation and Colonial Trade Policy,* 140.

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Ibsen's Symbolism in "The Master Builder" and "When We Dead Awaken"

BY PAUL H. GRUMMANN

William Archer in the introduction to his translation of *When We Dead Awaken* says: "But to his sane admirers the interest of the play must always be melancholy, because it is purely pathological. To deny this is, in my opinion, to cast a slur over all the poet's previous work, and in great measure to justify the criticisms of his most violent detractors. For *When We Dead Awaken* is very like the sort of play that haunted the anti-Ibsenite imagination in the year 1893, or thereabouts. It is a piece of self-caricature, a series of echoes from all the earlier plays, an exaggeration of manner to the pitch of mannerism. Moreover, in his treatment of symbolic motives, Ibsen did exactly what he had hitherto, with perfect justice, plumed himself upon never doing: he sacrificed the surface reality to the underlying meaning."

The misconception at the bottom of this statement is probably due to a onesided acceptance of the poet's insistence that his plays are not to be taken symbolically. In spite of the poet's attitude we have had critics without number who have attempted to find symbolism in Ibsen's plays. *Hedda Gabler* as symbolical of a revolver is probably the most picturesque of these attempts. The church tower in *The Master Builder* has been so completely plastered over with symbolic meanings that we are not surprised that Ibsen cried out in self-defense.

It is not proper, however, to accept the poet's statements in matters of this kind, because he cannot possibly give an objective view of himself. He may state his intentions but he cannot define his own activity. Since no man can state to what extent he himself thinks symbolically, Ibsen cannot throw any real light upon himself in this respect.

If we take the term symbolism in its traditional sense, according to which a special significance is arbitrarily attached to stated

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things, it is quite clear that *The Master Builder* and all the plays of this period are not symbolical. If, however, we take the view that all thinking is symbolical to some extent, then *The Master Builder* at once becomes symbolical to a marked degree.

Our conceptions of individuals are not objective, but we throw all kinds of abstract notions into these conceptions. A person who has stolen thus becomes a thief to us. The application of such terms as thief, liar, lick-spittle implies a measure of symbolism in our commonest conceptions. But the process does not end here. A certain individual of our acquaintance may steal and in addition may betray marked characteristics of dishonesty. This may be so pronounced that whenever the thought of dishonesty comes to us, an image of our dishonest acquaintance appears to our consciousness. We visualize our abstraction in the terms of a concrete personality. This gives us the basis of psychological symbolism quite unlike the older formal symbolism which, in my opinion, must remain a superficial art-form.

Ibsen's habit of thought is essentially symbolical in this sense. He sees an individual who impresses him as a type and around this individual he arrays the peculiarities of the type.

So in Nora, we see the type of the woman of strong individuality; in Mrs. Alving, the well-intentioned opportunist who makes the best of a bad situation; in Dr. Stockman, the scientific idealist; in Hedda Gabler, the strong-willed, self-respecting aristocrat; in Borkmann, the constructive promoter; in Solnesz, the conceited promoter who does not learn his profession, but uses spurious and unprincipled means to bolster up his deficiencies. Indeed, it might be said that Ibsen has created a kind of twentieth century mythology in these figures since they reflect our ideas in regard to these various types.

Since this is the case, we cannot consider Ibsen a realist of the type of Arno Holz, but an impressionist, for he retouches and readjusts his figures in order to present the types clearly. To what extent he does this consciously can, of course, not be determined definitely, nor is it a matter of great concern. This emphasis of the typical qualities of his characters is so marked that

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it renders many situations in his plays very improbable, clearly a violation of the realistic technique. This tendency is particularly clear in *The Master Builder*. That Mrs. Solnesz should prefer her dolls to her children violates our notions of probability, but as an impressionistic device of portraying the slavish devotion of this woman to her past, it is very effective.

To put it mildly, the appearance of Hilde Wangel is anything but realistic, anything but probable. She comes exactly ten years after the crowning of the church, she has no trunk, she is mature and rather shrewd yet takes seriously an offhand promise given by a man who clearly was posing for effect. In spite of her silly confidence in his promise, this daughter of a village physician at once sees through all of the tricks of Solnesz, resolutely readjusts his life, drives him up the steeple and insists on having him put himself on the merit basis.

But the moment we look upon Hilde Wangel as one who has the characteristics that we have learned to associate with the ideal, the inconsistencies disappear. As Lowell puts it, "some day the soft ideal that we wooed confronts us." Just so Hilde confronts Solnesz. We have learned in this connection to think of the ideal as "claiming of thee the promise of thy youth." We have come to think of the ideal as exacting, cruel, relentless, persistent and objective. As a type figure Hilde at a stroke becomes thoroughly plausible to us.

The genesis of the figure in the poet's mind is clearly this: Ibsen had met some woman whose actions and utterances reminded him strongly of the conception that he had of the ideal. Upon this concrete basis he gradually, consciously or unconsciously, worked out the Hilde of the play, giving her additional characteristics of the type that had become fixed in his mind.

In the portrayal of Solnesz, it is again the typical that is of interest to Ibsen. It is not at all probable that a given master builder who did not have genuine professional ideals would be dishonest to the extent to which Solnesz is. Let us remember how many characteristics and circumstances Ibsen has connected with this figure: Solnesz has not only failed to prepare properly

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for his profession, but does not work on the real problems of architecture after he has become established; he realizes that he has not really deserved his success, therefore accounts for it to himself on the personal ground—he feels that he has hypnotic, supernatural power, that he can accomplish things by willing them; his feeling of guilt is extended to events for which he is not responsible and gives rise to the "sickly conscience"; the feeling that he does not deserve his success makes him afraid to build churches, for the highest ideal he substitutes an inferior one, but glosses over his act, that is, he hypnotizes himself into believing that the building of homes is better than the building of temples; so definite does this feeling of guilt become that he fears youth and experiences a physical reaction every time a knock is heard at the door; he sells himself for a business chance and although he is conscious of his guilt, he keeps on sacrificing his wife and himself to the demon of success; with growing age the old ideals again make themselves felt, but he cannot rise to church building; he constructs a hybrid form—a dwelling with a tower—an architectural monstrosity.

A figure conceived thus is neither realistic nor probable, but the moment we look upon Solnesz as a type the exaggerations become as natural as they would be in an impressionistic picture or a high grade caricature. These types are then set over against each other as foils. So in Solnesz and Ragnar Brovik, Rubek and Ulfheim, Hedda Gabler and Mrs. Elvsted, Tesman and Lövborg, Ella Rentheim and Mrs. Börkmann, etc. etc.

On the whole, the interpreters of Ibsen have erred in looking too closely at details without reference to the basic idea of the play as a whole. "Sie sehen den Wald vor den Bäumen nicht."

The central thought of *The Master Builder* might be outlined in a few words as follows: A man who forsakes his highest ideals and attempts to find success by unworthy means will come to grief; he will again be confronted by his former ideals and these ideals will drive him to ruin. This central thought of *The Master Builder* continued to engage the attention of Ibsen, for we see it reappear in *When We Dead Awaken*. Before the last play was written Hauptmann's *Sunken Bell* had appeared.

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It is not rash to suppose that Ibsen's final study of this problem was affected by Hauptmann's solution. When Meister Heinrich feels the doubts taking possession of him he says: "So mag der Satan dieses Werk vollenden, Kartoffeln will ich legen, Rüben baun, will essen, trinken, schlafen und dann sterben."

Rubek does the same thing. He makes portrait busts for money, into each one of which he puts the features of some animal. He buys a villa, marries a young wife and decides to live without reference to his old artistic ideals.

This is the more external relationship, for Ibsen might have based this much upon his own *Master Builder.* But we have a different conception of the ideal which accords rather with that of the *Sunken Bell* than that of *The Master Builder.* Hilde remains steadfast and prods Solnesz up to the promise of his youth. In *Sunken Bell* Rautendelein goes to the Nickelmann when Heinrich forsakes her. The conception clearly is that an ideal degenerates when it is forsaken. This idea Ibsen works out consistently in *When We Dead Awaken.* Rubek casts aside Irene. She becomes totally depraved, yet when he meets her later he interprets into her all and more than all that she had ever been to him.

In *When We Dead Awaken,* the characters are typical just as they had been in *The Master Builder.* Rubek is the artist who at first lives up to the highest demands of his art, but then resolutely turns his back upon his ideals, commercializes his art and buys the comforts of life scorned by the real artist. His wife Maja (type counterpart) is the village belle without higher aspiration, who marries for position. Ulfheim is the brute man, Irene is the woman typical of the degenerated ideal.

Hauptmann in *Sunken Bell* and *Und Pippa tanzt* gives us a naturalistic picture of the inner life of Heinrich and the director; hence Rautendelein and Pippa are presented entirely as conceived by Heinrich and the director. Ibsen in *The Master Builder* and *When We Dead Awaken* presents typical characters, but in addition points out that Solnesz and Rubek encounter in real life actual experiences which remind us strongly of a man's relation

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to his ideal. This experience is so typical for artists that we may look upon it as symbolical. Whether Ibsen succeeds in completely harmonizing typical characters with typical experiences is a question which can hardly be discussed adequately in the present paper. There is little difference between *The Master Builder* and *When We Dead Awaken*, except that in the latter play the problem stands out more clearly. Ibsen had learned not to overload his play with unessentials to a still greater degree than in the earlier play. As for surface reality, the latter play is superior to the former. The development of Rubek's statue into a group is far more plausible than Solnesz's home with the nurseries. Irene in the flesh is far more plausible than Hilde in the flesh.

If we apply the theory of psychological symbolism to both plays we find a solution which is absolutely satisfactory, one that does not break down at any point.

The distinction involved may be brought out by a significant example. Rubek speaks of the railroad employees at the stations through which they have been passing. "No one got out or in; but all the same the train stopped an endless time. And at every station I could make out that there were two railway men walking up and down the platform—one with a lantern in his hand—and they said things to each other in the night, low and toneless and meaningless." When, as has been done, we attach a symbolical meaning to these men and this lantern we lose ourselves in meaningless surmises. If, on the other hand, we conclude that Rubek interprets a meaning into them that answers to his own state of mind we are on solid ground. The men were really there for a very definite purpose, they spoke in low tones for a very good reason not always observed by our railroad men at night, their lantern served a very practical end, yet to this morbid Rubek the whole scene became symbolical of the aimlessness of his activity.

But to return to Archer. He calls *When We Dead Awaken* a piece of self-caricature. If Ibsen has caricatured himself in this drama, he has at some time turned his back on his ideals and has produced nothing but spurious art. This indeed would be

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"melancholy and pathological." But fortunately the analysis of a man who has not lived up to the best that is in him is not melancholy and not even pathological.

In 1882 Ibsen wrote to Björnson:

"So to conduct one's life as to realize one's self—this seems to me the highest attainment possible to a human being. It is the task of one and all of us, but most of us bungle it." Ten years later he wrote *The Master Builder* which is dominated by this thought. All of his subsequent plays are clearly based upon this idea, but in *When We Dead Awaken* he centers his attention once more upon this theme. He therefore called his last play the dramatic epilogue.

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Ibsen's "Emperor and Galilean" and Hauptmann's "Kaiser Karls Geisel"

BY EMILY GERTRUDE MOORE

Kaiser und Galiläer[1]

Ibsen, writing to his friends in reference to *Kaiser und Galiläer,* spoke of wrestling, year after year, with the "Ungeheuer Julian." One feels that he chose his term wisely; the work is "ungeheuer." It consists of two five-act dramas, "Cäsars Abfall" and "Kaiser Julian." The central figure is Julian the apostate; the action deals, as is suggested by the title, with his conflict against Christianity.

The first drama, "Cäsars Abfall," is the stronger and more convincing of the two. Ibsen has gone skillfully to work to make clear all the forces that have moulded Julian. We are made to see why and how this lad, once possessed of a fervor of belief that made him a missionary among his playfellows, should reject his boyhood faith and turn to the religion of the past and the doctrines of pre-Christian philosophers.

His uncle, Constantios, is the official champion of Christianity. Yet he shrinks in terror from the sacramental wine; "it sparkles in the golden goblet like serpents' eyes—bloody eyes!" He is haunted by eleven shadows—Julian's father and mother, with nine others of his race, who were murdered in a single night, that Constantios might be secure upon the throne.

All around him Julian sees doctrinal bickerings, bigotry and self-righteousness. Moreover Christianity is, to him, a religion of fear, opposing a stern "thou shalt not" between man and every natural impulse; a religion that shuts out all joy and beauty from this world and bids man build all his hopes upon the world to come.

[1] The author's references are all to Paul Hermann's German translation of the play which forms Vol. 5 of Ibsen's *Sämtliche Werke in deutscher Sprache.* Ten vols., Berlin [1898–1904].

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Hence, to him, Libanios' words call up the vision of an ideal. "Es gibt eine ganze herrliche Welt, für die Ihr Galiläer blind seid. Da ist das Dasein ein Fest inmitten Bildsäulen und unter Tempelgesängen, mit vollen schäumenden Schalen, und mit Rosen im Haar."

Yet when he has drained to the dregs all that Libanios can offer him, he is not satisfied. "Ich musz leben, Gregor,—und dieses Treiben hier an der Weisheitsschule, das ist kein Leben." The wisdom of books has become mere prating to him. "Bücher nützen mir nichts—nach Leben hungert mich, Zusammenleben mit dem Geist—von Angesicht zu Angesicht! Ward Saulus sehend durch ein Buch? . . . Geschriebenes, das ist nicht Wahrheit für das Fleisch. . . . Es musz eine neue Offenbarung kommen. Oder eine Offenbarung von etwas Neuem."

From Maximos, the mystic, he hopes to find a solution of the problem. It is Maximos who first suggests to him the idea of a "Third Kingdom," which is to be founded upon the tree of knowledge and the cross. It is to have its source in Adam's Garden and in Golgotha. Julian conceives the idea that he is to be the founder of this Third Kingdom, and the rest of his life is profoundly influenced by this idea. But the concept remains vague; it fills Julian with a delusion of greatness, but it never inspires him to any definite, persistent and constructive course of action.

At the end of "Cäsars Abfall" Julian, who has hitherto vacillated between the conflicting claims of Christianity, paganism, Greek philosophy and mysticism, definitely cuts loose from Christian ideals and inspiration. Up to this point he has vaguely intended to carry out the mission predicted by his boyhood friend, Agathon, and urged upon him by Gregory and Basilios, and become the restorer of a purified Christianity. From now on Marcus Aurelius becomes his inspiration, and the customs of the ancients his law of conduct.

Archer suggests that while Ibsen wrote "Cäsars Abfall" in full sympathy with Julian, he ultimately came to realize the absolute inferiority of paganism to the religion Julian would supplant and also realized that he had nothing better to offer in its stead.

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Hence, in "Kaiser Julian," he wrote with a different point of view, so convinced that Julian was of necessity foredoomed to failure that he even "loaded the dice" against him, and made him out to be much worse than history gives us any warrant for supposing him really to have been.

Whether or not we accept this suggestion, there is no denying the inferiority of "Kaiser Julian" to "Cäsars Abfall." The second drama might with appropriateness have been called "Julian's Downfall," for he comes eaten up with childish vanity, he lends a ready ear to flattery, he condones the persecutions of the Christians and reconciles it with his idealization of Marcus Aurelius by the flimsiest and most insincere of sophistries. He is seized with the "Cäsaren-wahn." To his courtiers he is an object of derision, to his Christian subjects a demon of terror. At a time of general famine he pays no heed to his starving people, but goes about making sacrifice, even though the crowd jeers at his heels. As a rebuke to the frivolity of his courtiers he goes about clad in tatters and boasts that his unshorn beard swarms with vermin as the thickets swarm with game. To all criticism and antagonism he replies by writing interminable "Schriften," which he insists upon reading to his ennuied courtiers, and which but expose him to fresh derision.

Yet through all failures and humiliations he retains his "Cäsaren-wahn." Even after he has admitted to Maximos that the "Galiläer" is a living and conquering force in the hearts of men; even when, cast down by the failure to rebuild the Temple, he is ashamed to show himself again upon the streets of Antioch, he still clings to the delusion. He believes that through the Persian war he will yet win back all that he has lost, fulfil the prophecy of a Messias, and possess the world as a spiritual and physical ruler.

This war completes his undoing. He is tricked by Persian craft into burning his fleet and cutting his army off from its supplies. When, after weeks of wandering and privation, his army and the Persians come into conflict, he falls. But his fatal wound is dealt by Agathon, the friend of his youth, the convert of his

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early zeal, who has been rendered insane by long-continued tortures.

Kaiser und Galiläer is a tremendous piece of work, yet it abounds in faults which the critics have not been slow to point out. It is, to a certain degree, formless and unorganized. There are scenes of great dramatic power. There are also long arid stretches that tax the reader's patience to the utmost. "Characters in which we have begun to be interested, like Sallust, disappear entirely and for no reason, while to other less important ones far too much space is granted" (Reich). The reader is bored by unnecessary repetitions. More than one scene of real dramatic power is spoiled being re-echoed. The illusion of reality is largely lost; one feels always that Ibsen is intent upon working out his thesis, though this thesis or guiding idea is itself obscured by the multitude of details.

Archer, as well as other critics, has pointed out that Ibsen worked over the historical sources of the play very carefully. He even put into Julian's mouth certain passages from his writings. Ibsen himself laid special emphasis on this. He wrote that he was holding himself strictly to the historical aspect, that his drama was "realistische Dichtung" entirely and throughout, that he had seen the characters in the light of their time.

The historical accuracy of "Cäsars Abfall" seems generally to be granted; but as has been said before, Ibsen departs from history in "Kaiser Julian," and makes Julian worse and more contemptible than he really was. Archer claims that there is no historical warrant for representing Ursulos as the victim of Julian's offended vanity. He says also that Julian was not in reality a bigoted and relentless persecutor of his Christian subjects. Ibsen also exaggerates Julian's failures and humiliations. Jovian was not in reality an eye witness of the failure to rebuild the Temple at Jerusalem, and so converted to Christianity. The temple of Apollo was destroyed by fire, not by an earthquake brought on by the curses of a Christian bishop. Julian's conduct of the Persian war was not so blinded by folly and superstition as Ibsen represents.

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Certainly Ibsen was too thoroughly acquainted with the historical material of the period to have departed from it unconsciously. He must have done so with deliberate purpose. It is possible that he did it to make Julian appear more unequivocally as the instrument of the *Zeitgeist*. Brandes and Reich both incline to put forth the idea that Julian is so represented.

According to this theory Julian was indeed a chosen instrument to fulfil a particular and definite mission—the regeneration of Christianity. He might do this either positively or negatively, but the mission itself he could not escape. "Es stand Julian frei, der eifrigste Vorkämpfer oder der glühendste Hasser des neuen Glaubens zu werden. . . Julian erfüllt gegen seine Absicht die ihm zugedachte Rolle als Erneuer des Christentums" (Reich). Ibsen's "conception of Julian is that by this persecution of his Christian subjects he became the real creator of the Christianity of his age, that is to say, its awakener from the dead" (Brandes).

Certainly the drama offers some support for this view. Looking back upon preceding events in the light of the final catastrophe, we can see that the whole current of Julian's life set toward one definite goal and that he was carried along in this current with or without his own volition. The many visions, signs and like phenomena upon which he placed so much dependence are capable of a double interpretation. It is clear, too, that whichever way he interpreted them, he was fated in the end to fulfil the destiny allotted to him by the *Zeitgeist*.

Agathon's vision and his message that Julian was divinely chosen to wrestle with the lions, influenced Julian to take the first decisive step—the step which set in motion the action of the whole drama. Agathon's interpretation of this vision would have made Julian the champion of Christianity; had he followed its warning and never again set foot in the capital city, the activity and purpose of his life, though not its final effect, must have been wholly altered. Julian's own interpretation, on the other hand, culminated in his becoming the bitterest antagonist of Christianity.

The revelations of the spirits called up by Maximos in the "symposium" are all darkly equivocal. But, looking back at them

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in the light of the following events, we can see that they too indicate Julian's destiny.

JULIAN. Warum wurde ich?
EINE STIMME . . . Um dem Geiste zu dienen.
. . . . . .
JULIAN. Was ist meine Bestimmung?
DIE STIMME. Du sollst das Reich gründen.
JULIAN. Welches Reich?
DIE STIMME. Das Reich.
JULIAN. Und auf welchem Wege?
DIE STIMME. Auf dem Wege der Freiheit!
. . . . . .
JULIAN. Und durch welche Macht?
DIE STIMME. Durch das Wollen.
JULIAN. Was soll ich wollen?
DIE STIMME. Was du musst!

Looking at it from this point of view, we get a fine instance of poetic irony when Julian says to Maximos—"Ich trotze der Notwendigkeit. Ich will ihr nicht dienen! Ich bin frei, frei, frei!"

When Leontes comes and offers Julian Cäsar's purple mantle, Julian interprets this as the first step toward the founding of the "Third Kingdom," and as such accepts the honor, against the protests of Gregory and Basilios on the one hand and of Maximos on the other.

The sybilline prophecy itself led Julian to destruction, because of the interpretation he placed upon its warning to beware of the "Phrygian Regions," for this impelled him to burn his fleet, and on this one step "Disaster followed fast and followed faster."

The same theory finds further corroboration in Makrina's question to Julian—a question which he evades and will not answer. "Und lebt er (der Galiläer) nicht in deinem Hass und in deiner Verfolgung gerade so wie er in unserer Liebe lebt?"—Maximos, looking down on Julian's lifeless body, sees in him a "sacrifice of necessity"; Makrina and Basilios an instrument of the Lord, a rod of correction, not to death, but to new life.

Brandes says that the spiritual lesson of the drama is that "only that doctrine which finds willing martyrs among its followers possesses any intrinsic value." I am not inclined to be-

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lieve that Ibsen wrote his drama for the sake of setting forth this idea. Certainly we cannot accept the converse or else we should have to admit that the "Holy Rollers" and like organizations of hysterical and deluded people have a sound basis for their peculiar creeds. Yet Julian did undeniably feel this lack in the best that his own philosophy could offer, for he says to a group of courtiers:

"Ihr nennt Euch Nachfolger des Sokrates, des Platon, des Diogenes. Ist einer unter Euch, der um Platons Willen freudig in den Tod gehen würde? Würde wohl unser Priskos seine linke Hand opfern für Sokrates? Würde Kyrton etwa für Diogenes sich ein Ohr abhauen lassen? Ihr tätet es wahrhaftig nicht!" And again to Maximos: "Was hat der macedonische Alexander, was hat Julius Caesar, gewonnen? Die Griechen und Römer sprachen von ihrem Ruhm mit kalter Bewunderung, während der andere, der Galiläer, der Zimmermannssohn, in warmen gläubigen Menschenherzen als der König der Liebe thront."

Julian's fatal weakness is that he has no resources within himself. The man who is to lift humanity on its way can be no more dependent on the externals of one outworn creed than on those of another. Julian rejected Christianity, but in its stead he could offer only the doctrines already laid aside in the advance of progress. As Maximos said, he tried to turn the youth back into a child; he lifted his sword against the forces of evolution. He derived his inspiration and resolution almost wholly from signs and portents. When these were lacking he shrank from action and cried out against being forced to stand alone. Thus he lacked all the essential qualities of leadership; for the man who is to found the "Third Kingdom," if any one such appear, must indeed "come in his own name," must have in his own soul some new and inspiring revelation of truth.

Kaiser Karls Geisel

In *Kaiser Karls Geisel* Hauptmann deals with a theme somewhat like that of *Kaiser und Galiläer*. The treatment, however, is so essentially different that the similarity of theme is not at once

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apparent. The difference in the art of the two authors is well illustrated by the contrast between the dramas in question. One feels that Ibsen wrote *Kaiser und Galiläer* for the sake of bringing out a particular idea; and that his characters are merely means to that end. But Hauptmann thinks in terms of living beings. His first concern is to put before us men and women who are true to life, and if we would understand their significance we must first know them.

The basis of *Kaiser Karls Geisel* is given in the following paragraph quoted by Hauptmann from *Le sei giornate* of the sixteenth century: "It is written that King Charles, whom the French calling the Great compare to Pompey and Alexander, during his reign fell deeply in love with a young girl, who, as it seemed to him exceeded in beauty every other maiden of the kingdom of France during those days. The king was fired with such love for her and had his mind so corrupted by her tender and wicked caresses, that notwithstanding the harm that would come to his fame and honor for such a reason, and having given up the thoughts of governing his kingdom. . . ."

Certainly Hauptmann entered upon no light task when he undertook to treat naturalistically the heroic and half-legendary figure of Charlemagne. Yet in the very opening of the first act he brings him before us, vitalized, real, convincing. We recognize at once all the traits made traditional by history. He puts in his spare moments memorizing the list of the "eleven free arts," and writing it—with difficulty—upon a waxed tablet. He is a keen administrator and a mighty warrior. But there is something more.

He is possessed by a strange and restless spirit. In spite of his long and brilliant career, there is something in his life that fails to satisfy him. He says with "selbst-ironie": "Ich bin ein Franke! Wer bestreitet's?—Frei! Wer leugnet's? ein Gefangener meiner Pflicht!"

The stern and simple code of duty that he has followed all his life seems inadequate to him now. The tasks that seemed all-important have grown trivial. With Solomon he is ready to say:

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"Wie alles eitel, ganz nur eitel ist,
und wie geschieht, was schon geschah, getan wird,
was schon getan ist: säen, pflanzen, ernten!
Paläste bauen und zerstören! Länder
bevölkern und zur Wüste machen! . . . Schätze finden, sie
verlieren und suchen, wiederfinden dann!"

He feels that he stands in the shadow of approaching death, but he still craves an aspect of life that he has never known, a something subtle and beautiful that he cannot define. He is, in reality, struggling with the same problem that perplexed Julian. But he does not set about solving it through abstract speculation. In the person of the Saxon "Geisel," Gersuind, he finds himself confronted with the living, palpitating soul of paganism itself. The drama at once resolves itself into the clash of these two personalities and to a certain extent into a struggle between Christianity, as represented by Karl, and paganism, as represented by Gersuind.

The technique of Hauptmann's presentation of Gersuind is very interesting. He gives us no less than seven distinct and different conceptions of her character. We see her as reflected in the minds of her uncle, of Rorico, of Ercambald, of Karl, of the Oberin, of Alcuin and of the people, and yet remain not a little puzzled as to what the real Gersuind really is.

At Gersuind's first appearance we see, and are influenced by, her uncle's conception of her. He is indignant at her confinement in the cloister and calls her a captive bird, pining in a narrow cage and longing to return to its old free life. To him she is the innocent victim of an unjust fate.

In sharp contrast to this is the conception held by Ercambald, Karl's chancellor and chief church official. In his eyes she is of the very essence of the stubborn and heathen Saxon folk, who persist in returning to their ancestral deities "wo nicht Stock und Rute und Faust dawider ganze Arbeit tun."

Ercambald himself is the very embodiment of the conventionalizing, desiccating influence of the phase of Christianity he promulgates. Gersuind's fate is to him a mere passing incident; with Karl's decision to return her to the convent school the incident

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is closed. He is, however, not wholly insensible to her strange power:

> ". . . hier heisst's, behänget Euch mit Spiegeln,
> so stirbt der Basilisk am eigenen Blick.
> . . . Seht sie an!
> seht sie nicht an; noch besser! denn es ist
> in ihrem Auge was, das Spiegel trübt!"

But it creates in him only uneasiness. He puts on her and all that is inexplicable about the all-comprehensive label "heathen," and turns to the truly important affairs of life, such as the reception of ambassadors and the inspection of the apple harvest.

Ercambald has grown old in the Kaiser's service, but now Karl revolts from him utterly and persistently refuses to endure his presence. Rorico attributes this to Karl's resentment of Ercambald's treatment of Gersuind. But while this is certainly one of the many signs of Gersuind's influence over Karl, he is too big a man to be long moved by petty resentment. His attitude toward Ercambald is actuated by something deeper and more subtle. He revolts from the whole philosophy of life that Ercambald represents, because it suddenly appeals to him as unbearably didactic and self-complacent. With Julian he is ready to challenge the type of Christianity among courtiers "die ihre Hände über dem satten Bauch falten und piepsen ob Gottes Sohn wirklich aus nichts erschaffen ist."

The first act is crammed with indications of Gersuind's influence over Karl. His whole attitude, the strange restlessness which perplexes his courtiers, is her work, it is manifest, and dates from his meeting with her in the cloister school. Gersuind's radiant beauty and the touch of something uncanny and inexplicable about her, her "unkindlich-Wissen und Verstand," make her a personality that claims the attention of every one. But Karl alone feels and responds to the challenge which she, simply by being what she is, breathes out against the whole organization of society, the structure of church and state which Karl has championed and brought to a perfection never before seen. This gains the stronger hold on him because it remains a feeling and never gets upon the basis of definite and articulated thought. He does

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not know the secret of her influence over him, though he busies himself with setting up hypothesis after hypothesis to account for her.

His first conception of her is largely idealized. "Rein wie der Mond, das Antlitz einer Heiligen"; and again,

> "Dies blonde Gras auf Kinderköpfen . . . wie,
> sind diese Fäden feinsten Goldes, dies
> Gespinnst der Unschuld . . . ist es nicht ein Wunder?"

Gersuind's attitude when he speaks with her alone does not fit this hypothesis, as Karl at once feels. She startles him by her entire lack of regard for her uncle, but most of all by her conception of him and his reason for wishing to speak with her quite alone—"Ich kann auch schweigen, König Karl." He is even more puzzled by her ideals of life, so utterly opposed to all the traditions and conventions of the world he knows. She desires only to go her own way, answerable for her actions to no one, free to do whatever she enjoys doing at the moment. Karl cannot fathom her but he sets her free to work out her fate according to her own notions of life.

Left alone with Rorico, Gersuind at once exemplifies her attitude toward life. Rorico's youth and attractiveness appeal to her own youth, to the instincts of her nature. Untrammeled by conventional standards or moral scruple she makes an instant and direct appeal, "Schöner, nimm mich mit!"

Rorico is young, human and no model of virtue, but he recoils from this, not because his standards of right doing are outraged but because her "being is strange and through strangeness terrible." He cannot comprehend her, therefore she repels and terrifies him. His attitude and his words to her give his interpretation of her very definitely.

> "Ja, wie ein gelbes Schlänglein in der Gabel,
> So! ja! im Spalt von einem Haselzweig:
> dass es nicht züngeln kann und mich nicht stechen!
> Komm Racker, Dämon! aus des Kaisers Haus! (Er hält sie mit zwei Fingern am Saum ihres Kleides im Nacken von sich ab und schiebt sie vor sich her hinaus.)"

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Gersuind, present and face to face with Karl, is a puzzle; absent she becomes a torment. In the solitude of his country estate he is haunted by the thought of her; she becomes again "die Heilige" to him. The revelation of her infatuation for Rorico and her persistent pursuit of him is a shock to Karl but his anger is directed against Rorico, not Gersuind. As the two face each other again there is repeated the clash, not only of two powerful personalities but of two absolutely different conceptions of life. Gersuind has been living the life of her own choice and has no complaint to offer, but Karl reproaches himself for having cast her out defenceless into a sinful world.

> "Ich tat dir Unrecht! denn ich war's, es war
> die Laune des Gebietenden, die dich
> hinunter stiess in jenen Abgrund, den
> ich kannte: unrein, wimmelnd von Geschmeiss.
> Ich war's und reiche heut' dir meine Rechte,
> um aus dem tiefen Elend, das du nun
> ermessen hast, dich an das Licht zu zieh'n.
> Verstehst du das?
> GERSUIND (lachend). Bei Irmins Golde, nein!"

By the standards of her own tribe Gersuind is an outcast, as Karl points out to her, but she refuses to accept these or any other standards. Under this pressure Karl is forced to abandon his conception of her as "die Heilige."

> ". . . Ich sehe freilich nun,
> dass du gedankenlos und blind nicht handelst,
> vielmehr mit Vorsatz, Kühnheit und Entschluss,
> das Böse suchst . . .
> Doch wenn ich dich betrachte, fass ich's nicht!"

On the very face of it Gersuind is manifestly an enigma to Karl; but while it is not quite so self-evident, Karl is just as truly an enigma to Gersuind. That she retains her first and false conception of him she shows by suddenly flinging her arms around his neck with an appeal to the primitive, brute man in him—"Sei doch nicht närrisch, Alter!"

Here is the real turning point of the action, and Karl does not conquer without a fierce struggle:

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"Geh! habe Mitleid! denn Vernunft erstickt
und jede Macht der Majestät vor dir
und in dem Lächeln deines dünnen Mundes!"

In all of *Kaiser und Galiläer* Ibsen did not once bring into such dramatic and telling conflict the essence of Christian ideals, which is self-denial and self-control, and the essence of paganism, which acknowledges neither, but gives free rein to individual impulse and desire.

Karl conquers in that he does not yield, does not consent to give up his own standards of living. But he is very far from conquering in his attempt to impose the same standards upon Gersuind. He sets up a new hypothesis to account for her:

"Noch blinzelt deine Seele, halb erwacht
erst, und du tappst im Zwielicht."

His new plan for her reveals the fineness and magnanimity of his nature:

"Hier dieser Edelsitz ist dein, Gersuind!
In diesem Garten sollst du wurzeln, du
Entwurzelte! . . . Fröhlich magst du sein
im Schutze deiner Mauern, unbetrübt!"

In reality, however, it imposes Christian ideals hateful to Gersuind, who does not wish protection and shelter but freedom from all restraint. She accepts the plan perforce but she is very far from accepting the ideals. She does not remain wholly unresponsive, however, to Karl's largeness of nature, as she reveals by kissing his hand.

For Karl the situation is complicated by a dozen conflicting elements. Gersuind's glowing youth makes him feel and resent his own age. For the first time in years his mind has turned from the affairs of state to the concerns of his own personal happiness and he feels half-defiant, half-guilty. The forces of tradition are strong in him and Gersuind outrages them at every turn. The greatest complication of all is his growing love for her. He will not cast her out for refusing to accept his standards, yet he cannot lay them down for hers.

This harassed state of mind prompts him to send for Alcuin,

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partly for the sake of sympathy, partly to see what he makes of Gersuind. Alcuin represents a type of *Weisheitslehrer* some four centuries later than the era of *Kaiser und Galiläer*. He stands for scholasticism at its best, and in simplicity and sincerity of character is far superior to the type of *Weisheitslehrer* represented by Libanios. His attitude toward Gersuind is, however, frankly heathen. If her youth and charm can bring rejuvenation to "this earthly Zeus," as he calls Karl, why not? Yet he sees in her much that Karl does. Her words, all that she is and does, set him to pondering.

The wild revel at the tavern is proof of Gersuind's continued refusal to accept Christian standards. This comes partly as a reaction from long confinement, partly because Karl's unresponsiveness has wrought her to a frenzy.

The natural man in Karl blazes out when he hears this. It is not merely jealousy. He realizes that she has put him in the light of a dupe and a laughing-stock before the people, and feels that his kingly honor demands her death. This threat awakens in Gersuind the blind and passionate craving for life that is wholly primitive. She sinks to her lowest in a wild appeal:

> "Lass mich leben! lass mich leben!
> schliess mich in schwere Ketten, König Karl:
> und keiner soll mich sehn als du! und niemand
> als du, soll mich fortan berühren! niemand
> die Ketten, süsser Vater, um mich tun,
> als du! auch lösen, starker Cherub, niemand
> als du! nur du! du Gott des Himmels! du!"

She rallies from this and returns to her natural pride and defiance in the next appeal, which arouses Karl's sense of justice and prompts him to set her free:

> "Was hebst du Wegwurf auf? was liessest du
> mich Wegwurf denn nicht liegen, wo ich lag,
> und hobst mich auf? du tatest's ungebeten!
> Ich klagte nicht! ich schrie nicht, rief dich nicht!
> Ich warf mich nicht vor deine Füsse hin
> und bettelte: nimm, heb' mich aus dem Staube!
> du aber packtest mich und hieltest mich:
> Warum? wozu? der du doch mein nicht achtest,
> nur meiner spottest, meiner nie begehrst!"

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And yet she is loath to leave this garden which she claims has been so cold and hateful to her, and she catches up and carries off the ring which Karl has thrown away.

The first half of the concluding act is largely given up to emphasizing this change in Gersuind's attitude toward the Kaiser. She is dying of poison administered by Ercambald the night of the revel at the tavern. She, to whom all wine is hateful, drank the draught because she fancied it to be Karl who offered it:

> "Er hatte langes Haar: wie Kaiser Karls
> so weiss, und deshalb trank ich sein Gemische."

She cherishes the ring still. Her infatuation for Rorico is gone:

> . . . "Er
> ist schön! doch nicht, wie Karl! bei weitem: nein!
> Karl ist ein Gott! wir andern sind nur Menschen!"

The final proof is given by the Oberin, who tells the king that Gersuind died with his name upon her lips.

There can be no question, it seems to me, that Gersuind is brought to realize the greatness of Karl's character. This softening cannot be due merely to physical weakness, for she exhibits all of her old perversity toward the sister who waits on her so faithfully. It would perhaps be too much to say that she accepts Karl's point of view, or his philosophy of life, but she is overcome by his personality.

But though Karl is the victor in the conflict of personalities, he does not come off scatheless. He is tormented by remorse for having cast her off. But this is not all. According to all the traditions of his faith and training, she must be, as he says, "eine Flocke Höllenglut," and yet his bigness of soul revolts at this and refuses to accept it. In whatever light he regards her, she upsets his fixed ideas of life, and retains her influence over him as something mysterious, tantalizing with the hint of a vision caught for an instant but not comprehended. There is something very noble and pathetic in his last words about Gersuind:

> "Recht so: hebt sie empor! tragt sie hinweg!
> Ich muss noch immer lernen! Muss von ihr

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auch das noch lernen, was sie mir verschwieg!
Sagt niemand, dass ich noch von Kindern lerne,
hört Ihr? sagt ihnen: unser König Karl
weiss nicht, was Irrtum ist! sagt ihnen, er
sei hart wie Diamant und weine niemals.
Seht Ihr den Mann, der jener Toten nachfolgt?
die Menge weiss von diesem Manne nichts!
lasst ihn—verratet nichts!—lasst ihn nur gehen!
Was er nicht kannte, wird dem Volke nun
nicht fehlen: und ein Greis bleibt ihm zurück."

Kaiser Karl is, in my opinion, the finest man that Hauptmann has ever given us. Yet I feel that the title was rightly chosen, and that the drama was really written for the sake of Gersuind. In her Hauptmann has presented a perfectly natural and unartificial personality. Viewed in this light all that is perplexing and contradictory about her character becomes perfectly explicable. She is utterly free from the whole body of moral principles, conventions and traditions built by society through thousands of years of evolution. As she truly says of herself:

"Ich bin ein Kind von eurer Eva nicht
und eurem Adam: meine Ureltern
assen von eurem Sündenapfel nicht!
drum weiss ich also nicht, was gut und böse."

In spite of her Saxon parentage she is no no way representative of the tribal standards. She is not a Saxon; she is the spirit of paganism.

I do not think that Hauptmann presented her as an ideal to show by contrast the degradations brought about by civilization. Yet when she is placed in the midst of a relatively complex and artificial society, she does make certain things stand out very sharply. Ercambald, who wrought her death, shrinks into insignificance beside her. She utterly silences scholasticism, even as represented by so noble a type as Alcuin. But Rorico and the Oberin seem larger and finer at the end than at the beginning. Karl gains immeasurably by the contrast. Whatever is false or artificial cannot stand the test of her presence, but simplicity and sincerity shine the brighter for it.

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SHAKESPEARE AND HIS LONDON ASSOCIATES AS REVEALED IN RECENTLY DISCOVERED DOCUMENTS.

BY CHARLES WILLIAM WALLACE

Most of the fifty-six records published in the following pages belong to the Court of Requests of the reign of James I, the extensive proceedings of which had lain unexplored until they were prepared for examination at my request. As a result of careful search by myself and my wife, I am this year publishing the rest of the important theatrical evidences that these proceedings hold.

Not every record in such a series, mainly in suits at law or equity, is, when taken alone, of high importance. There is no advantage, however, in complaining that a single human act does not resurrect Shakespeare in the flesh, or that a grain of sand does not rehabilitate the old theatres. It is through the aggregated whole that each part is enabled to contribute its proper use and worth, though singly it reveals no potentiality. Slight as some of these records are, and mutilated as some of them have come to us, there is not one, now that we have them, that the historian in his devotion to the true and abjuration of the fanciful would dispense with.

The court-pleadings, subsidy rolls, parish registers, and transcripts of wills are written on parchment, the rest, on paper.

Fifty-two of the records here presented are written in the

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modified Gothic hand used by most men of Shakespeare's time, while four, from the French, are in slightly gothicized Roman. This is a fair proportion of Gothic and Roman writing among the contemporary records of English archives. Although a score or more of different scribes are represented, there is greater uniformity in the characters used than in handwritings of today, and the script is generally easier to read than that of many of the letters that come to me from all parts of the world. The native English hand of Shakespeare's time, a modified inheritance from the ancestral Anglo-Saxon, was essentially Gothic. That hand rather than the invading and little used Roman was taught in all the schools. Scholars and their university protegés mainly constituted the small number of men who wrote the Roman. Those who understand the practices and requirements in schools, universities, and business life of Germany of today with reference to these two scripts have a fair basis for judging earlier English conditions.

In presenting these records, I have chosen to introduce each of the three sets with a very brief notion of their nature. But the items of fact must be gleaned from the documents themselves. Brief explanatory head-notes in brackets accompany many of the documents.

As there is no uniformity of spelling in the originals, so there is none in the present print. No more is there a uniformity in the use of signs of contraction in the originals, and the consequent dissimilar expansions here. The printing of all signs would have required special type. Instead, therefore, italics are used to show the expansion of a shortened form. Latin words are generally spelled out in full, even when no sign was used. But in the body of a document, when a contracted form is retained, it means that the original was written without sign. Short "s" has been substituted, as usual, for long "f". While these devices of typography are far from ideal, this explanation will make their uses clear. It is hoped that the reader may find that the aim throughout to represent the original faithfully has been attained.

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I

THE BELOTT-MOUNTJOY CASE.

The thirty-nine records assembled chronologically here, three from the Parish Registers of the St. Olave, Silver street, twenty-nine from the Public Record Office, five from the archives of the French Protestant Church, Soho Square, London, and two from Somerset House, combine to make a contribution to Shakespearean biography of unusual interest and of considerable importance. The first report of these documents, published in *Harper's Magazine,* March, 1910, has been discussed not only by scholars and literary periodicals but by the public press.

There are two chief reasons for this unusual appeal to scholar and layman. First, the matter is sensational in its nature, and would appear so even if it related to the most prosaic folk of our own time and were reported in the daily press. But that sensational quality is multiplied a hundred fold by being associated with the greatest poet of all times and climes, in whom all people are more or less interested. Second, an increased yet withal sober desire for new knowledge about the man we all love makes the world hail new information at this late day with enthusiasm. I could wish this latter were the prime reason for the extraordinary interest. But that was not to be hoped for at the outset. Indeed, the sensational nature of the whole story made me hesitate, as some of my scholastic friends on both sides of the water will recall from our conversations and correspondence, to present it to the public in popular form, lest too much attention should be drawn to the catchy and minor rather than to the essential and contributive items of human interest and biographical information.

On the other hand, this very undesirable sensationalism has been of advantage in a measure, by serving as a raft on which to float the new information to universal ports. Men and women thereby have been inspired with enthusiasm to learn more about Shakespeare than they knew before, and to read more of his plays or to reread familiar ones more keenly than before, while students of his biography have been brought to look with closer

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inquiry into the truth or falsity of what has hitherto been written down as a heritage of placid acceptance. Therein good and desirable ends are served, which, men will agree, more than counterbalance the evil of sensationalism that clings about the documents and the story they tell in any form.

It remains now for the new information to complete its legitimate work in the world, by appeal to the sober judgment. To this end, the documentary evidence itself is the first essential, and a cool, analytic, judicial brain the second. Whether every reader may justify this latter requisite as a compliment to himself or not, remains with him and the rest of the world to settle. That the reader may have free and independent range, the records are printed here *in extenso,* barren of all interpretative comment. It is impracticable to present also the thousands of contemporary records, or even extracts from them, bearing upon the life of the times, and illuminating much in these thirty-nine thus isolated from their surroundings. While I admit some advantage over the general reader in this regard, still there is quite enough here and in available print to enable the scholar to make an honest judgment of the materials, and that is all sufficient for all men of all times. Later, with more leisure at my disposal than I can now command, I hope to join him in that same sort of effort, and to derive benefit from his labors as he may from such of mine as here appear.

In deciding what documents to present in the case, it seemed best, since not all could be given, to confine the list to those of direct bearing. The records from the Lay Subsidy Rolls and the Parish Registers show Mountjoy, with whom Shakespeare lived, a resident of St Olave, Silver street, from some time in 1599. The suggestion of still earlier residence there, since the subsidies were allowed in 39 Elizabeth (1597), is borne out by analysis of the other records. The whole long series of twenty-six documents in the Court of Requests and the five others from the Consistory of the French Protestant Church of London, arising directly out of the marriage between Stephen Belott and Mary Mountjoy, arranged between them by William Shakespeare at

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request of Mary's mother, belong inseparably in the series. Even the last of these in the Consistory, showing Mountjoy's insubordination to the Church and his moral obliquity since the death of his wife, thus explaining the foundation for Belott's charges against him in the Court of Requests in the matter of his recent reckless living, are necessary, for a case was rarely referred from a civil to an ecclesiastical tribunal except on moral grounds. That both Mountjoy and Belott were French is shown in Mountjoy's patent of denization and Belott's will, as well as in the Lay Subsidy assessments and the testimony of Humphrey Fludd. That they were Huguenots appears from the Consistory records and the will.

To these essential documents might have been added others of a more or less side-illuminative nature, such as records relating to Daniel Nicholas, son of Sir Ambrose Nicholas, a former Lord Mayor of London, others concerning Humphrey Fludd, the King's trumpeter, who as a member of the royal household was often employed to carry letters to and from Paris and other places on official business, and so on. Such of these as throw light on the character and standing of Shakespeare's neighbors and associates in this case I may assemble for the final treatment. The rest may be passed with a reference.

The value of these documents lies chiefly on the side of human interest rather than of contributive knowledge. Partly because of this and partly because of the very appreciative but unsigned editorial note set at the head of my article in *Harper's Magazine* for March, 1910, I have been credited with a judgment of the contributive value of these documents which in the course of my article I take special care to show they do not possess. My entire article, from the title to the last word, puts forward sharply and unequivocally the features of human interest. In this regard, it is true that no other document or series of documents in Shakespearean annals equals these. But human interest is a very different matter from contributive knowledge, which the general public has taken to be one and the same thing. In the article I took care to differentiate these two qualities and pointed out that

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the present documents do not have the contributive worth possessed by the Osteler-Hemynges records, as will more fully appear in the final analysis of them.

Without further comment, the records in the Belott-Mountjoy case are here presented *in extenso*.

[1]

Lay Subsidy Rolls, 31 October, 41 Elizabeth, Box 146, Roll 390.

[Mountjoy's Assessment, 1599.

Under "St Alphege and Sainte Olaues Parishes" are taxed for this year only two "Strangers," that is, foreigners, one of whom is assessed as follows.]

Christofer Monioye ———— v[li] ———— xxvj[s] viij[d]

[The first amount of 5*l*. is the property value, upon which the second amount, 26*s*. 8*d*., was paid as a tax. Citizens were taxed 4*s*. in the pound on lands, and 2*s*. 8*d*. on goods, while aliens were taxed double on both. The above tax of 26*s*. 8*d*. shows that Mountjoy was assessed on goods only, at the usual double rates levied on foreigners.]

[2]

Lay Subsidy Rolls, 1 October, 42 Elizabeth, Box 146, Roll 409.

[Mountjoy's Assessment, 1600.

On October 1, 42 Elizabeth, the assessment of the 3[d] subsidy granted in 39 Elizabeth shows that the adjoining parishes of St. Alphage and St Olave had but one "Straunger," who is recorded under that heading with the same tax as in 1599 thus:]

Xpofer Monioye ———— v[li] ———— xxvj[s] viij[d]

[The two notices above are the only records of Mountjoy in the Subsidy Rolls, which I have personally searched. Later, I find the Huguenot Society, in its three great volumes of *Aliens in London*, likewise finds him but these two times.]

[3–5]

Parish Registers, St Olave, Silver street, London.

[Mountjoy.—Burial and Marriage Records.]

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Burials

[3]

1600–[1]

Joseph Tatton, *ser*vante to Christopher Montioye. . .January 14.

[4]

1606

Mary, wife of Christofer Montjoy . . . October 30.

Mariages

[5]

1604

Stephen Plott, and Mary Montjoye . . . Nouember 19.

[6]

Patent Rolls, 5 James I, Part 30.

[Denization of Mountjoy, 27 May, 1607.

It was the Sovereign's practice to grant to some lord or knight patents of denization, by which such patentee could go to foreigners of the realm and get from them all the fees possible for making them denizens. In this case, a patent had been granted to John Levingston, Esq., by which fifteen foreigners, on the 27th of May, 1607, as recorded in the last patent of this roll, were made denizens. The fees, being a private perquisite, are of course not stated. Preceding the list of those denizenized here under Levison's patent are two other short lists on the patents to two other farmers of such privileges.

The form of denization is in Latin, and is written out in full for the first alien only. For the others, "consimiliter" is used. But to each person denizenized the full form was sent. The pertinent part here reads as below.]

Jsti qui sequnt^{ur} concedunt^{ur} p*er dom*inum Cancellar*ium* Angl*iae* virtute warran*ti* Regis Joh*anni* Levington Armig*e*ro fact*i*./

[Here follows the list of fifteen, sixth of which reads]

Cons*imiliter* Christofero Monioy in villa de Cressey sub obediencia Regis ffranco*rum* oriundo *Teste Rege* apud Westmo*nasterium* die & Anno [i. e., 27 May, 5 James I] supr*a*scripto./

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[7–32]

BELOTT VS. MOUNTJOY.

Court of Requests, James I, Uncalendared. Case of Stephen Belott vs. Christopher Mountjoy.

[Four skins, comprising Bill, Answer, Replication, and Rejoinder, thonged together as usual at upper left corner; three sets of paper depositions thonged to their three respective skins of interrogatories, comprising fifteen documents, one of which is Shakespeare's deposition. These nineteen documents, since my report of the case to the Master of the Rolls and publication in *Harper's Magazine* for March, 1910, have been withdrawn from circulation and are now preserved under glass in the Historical Museum Room of the Public Record Office. Seven other records are in the Miscellaneous Books of the Court of Requests. Besides these twenty-six documents preserved in the Public Record Office, bearing directly on the case, three others, touching Mountjoy, are also there. Other information is furnished by the Parish Registers of St. Olave, Silver street, concerning the family and marriage as presented above, and by the consistorial records of the French Protestant Church, Soho square, London, containing notices of the action taken by the Church in accordance with the Court's final order referring the case there for settlement, and by Belott's Will at Somerset House.

It is remarkable that every court-record in the entire case is preserved, as published below. The set of depositions in which Shakespeare's testimony occurs is slightly rotted along the right edge. All the rest are splendidly preserved.]

[7]

BILL.

[*In dorso*] xxviij° die Januarij Anno *Regni Regis* Jacobj Angliae &c Nono et Scotiae xlv°

per war*rantum*

To the King*es* moste Excellent Ma^{ty}

In all humblenes Complayninge sheweth vnto yor moste excellent Ma:^{tie} yor highnes poore and faythfull and obedient subpliant Stephen Belott of London Tyermaker, That whereas yor Suppliant aboute nyne ·yeares sithence laste paste beinge then a

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Servant vnto one Christopher Mountioye of London Tyer maker [did] well Carry and behaue himselfe in the tyme of his saide service wth the saide Christopher bothe iustly & to the greate *pro*ffitt and advantage of the [said] Christopher, as that thereby yor saide Suppliant in all outwarde appearance did obtayne the good will and affec*i*on of him the saide Christopher in suche sorte as hee then offered vnto yor saide Suppliant, that yf hee would accept in marriage one Marie Mountioye beinge his daughter and only Child that then hee would giue in Marriage wth his saide daughter vnto yor saide Suppliant the somme of three scoore poundes or thereabout*es* for a porc*i*on vppon yor saide Suppliant*es* daye of Marriage or shortlie after and would likewise at the tyme of his deceasse leaue vnto yor said Suppliant and his saide daughter the somme of two hundred pounds more vppon wch offers of ye saide Compt.^lt^ and vppon his p*er*swac*i*ons yor said Supp.^lt^ did shortly after entermarry wth the saide Mary and haue liued togeather by the space of theis five yeares and haue had diuers Children betwixt them to the greate encrease of theire Chardge and are likelie to haue manie more so that theire poore trade is not able to giue them maintenance and yor saide Suppliant lent the saide Christopher the somme of fortie shillinges wch hee denies to paye or to p*er*forme his former promise, But so it is may it please yor moste excellent Matie. that yor said Suppliant growinge since his saide entermarriage wth the saide Mary into some want and necessitie by the reason of the encrease of his Chardge as a fore saide yor saide Supp.^lt^ therefore repaired vnto him the saide Christopher desiringe him to satisfy and paye vnto yor saide Supp.^lt^ the said somme of three scoore poundes soe promised by him vnto yor saide Supp.^lt^ as all so to putt in suertyes to leaue yor Supp.^lt^ and his wiffe tow hundred poundes att his deathe, who all together forgettinge his ffatherlie promisses nor pityinge the distressed poore estate of yor said poore Subiecte and his greate Chardge verie vnnaturally dothe not only nowe deny his said p*ro*misse and refuse to paye the said somme of three scoore poundes but likewise denieth the payment of the saide somme of ffortie shillinges so lent him as a fore said. As allso hath sithence

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giuen forthe diuers tymes to diuers p*er*sons, that hee intendeth not to leaue vnto yor Supp.^{lt} his wiffe nor Children the vallue of one penny when soever hee shall dep*ar*te this naturall lyffe, beinge not onlie to the greate [hurt] and hinderance of yor said Supp.^{lt} his wiffe & famyly but alsoe to theire vtter vndoeinge yf they bee not releiued by the iustice of this honorable Courte, & beinge a man of good estat & wthout charge. In Tender Consider*a*cion whereof and for asmuche as by ye strict Course of the Common lawes of this Realme yor said pore subiecte is remediles either to recover the said three scoore poundes soe p*ro*missed as aforesaid or to Compell him the saide Cristopher Mountioye to putt in suretyes to leaue tow hundred poundes to yor highnes poore subiect & his wiffe at his death beinge of late inclyned to waste his estate for that yor said subiect cannott prove the saide promisses in soe strict manner as by the Common lawe is required or yf hee Could yet hath not yor said subiect by the said Common lawes of this Realme ffitt or apt remedy neither is yor saide loyall subiect able to proove the loane of the said fforty shillinges to ye said Christopher Mountioye but p*er*swadeth himselfe that the said Christopher either to dischardge a good Conscience as knowinge p*er*iurye is a moste damnable sinn or to avoide the punishment inflicted on such as Count the saide sinn, may it therefore please yor highnes the p*re*misses Considered, To graunt vnto yor subiect yor highnes moste gracious writt of privie seale to be directed vnto the said Christopher Mountioy Com*m*aundinge him thereby at a Certayne day and vnder a Certayne payne therein to be directed p*er*sonally to appeare before yor highnes in yor highnes Courte of White Hall Comonlie called the Court of Request*es* Then & there to make a direct answer to the p*re*misses and to stande to suche further order & direction therein as by yor highnes or yor said Counsell shalbe thought meete to stand wth equity & good conscience, And yor said loyall subiecte accordinge to his bounden dutye shall hartely pray to god to p*ro*longe yor highness happy Raigne and lyfe longe to Contynewe./

Raf: Wormlaighton.

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[8]

ANSWER.

Tertio die februarij A° Regni Regis Jacobi Angliae &c nono, et Scotiae xlv°./

The Answeare of Christopher Mountioy to the Bill of Complainte of Stephen Belott Compl^t

This defendante All advantages of exception to the Insufficiencie and Incertainty of the sayd Bill nowe and at all times saved vnto him for answeare thervnto and for the manifest declaration of the truth saith That about ten yeares last past the defendante was Contentented [*sic*] at the Entreaty of the sayd Complainauntes friendes to accept of the Complainaunte to serve him as a prentise to learne his trade being a Tyremaker his said frendes promissinge to finde him Convenient apparrell while he shoulde so Continue in this deffendauntes service. and the said Complainaunte did serve this defendaunte as a Prentice to learne his trade the space of six yeares or thereaboutes But dueringe all the time of his sayd service neither the Complaynaunte nor any of his friendes did according to theire promise fynde him any apparrell att all savinge Linen but this Defendaunte was enforced to finde him all the Residue of his apparrell duering all the sayd time neither had the Complainaunte duering all the sayd time of six yeares any further or other releefe or oth^r maintenaunce from any of his friendes but was duering all the saide time wholy and solye mayntayned by this Defendaunte And after the said Complainaunt had served this Defendaunte as aforesayd the said time of six yeares then the said Complainaunte was desierus to travell into spaine and this Defendaunte did furnish him wth mony and other necessaryes for the Iorney to the vallue of six poundes or theraboutes after which time the sayd Complaynaunte returned from his travell vnto this Defendaunte againe and was a suter vnto this Defendauntes daughter to marry her and to that purpose did move this Defendaunte and his then wife for theire Concentes for the marriage which this Defendaunte and his sayd wyfe being poore and able to bestowe lyttle or nothinge wth their

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sayd Daughter in marryage (save y^t^ this Defendante had then brought her to a good perfection in his sayd trade of Tyermakeinge) was Contented to yeelde vnto: though the said Complainaunte neither then had nor ever sithence to the knowledge of this Defendaunte any mony, or other valluable goode*s* or lande*s* whatsoever from his sayd friende*s* nor any other thinge whatsoever but what he had gotten in this Defendaunte*s* service and by the trade that this Defendaunte had learned him And afterwarde*s* vid. about five yeares past the sayd Complainaunte was marryed to the sayd Daughter of this Defendaunte at which mariyage it was agreed betweene the said Complainaunte and this Defendaunte that if the sayd Complainaunte with his wife shoulde Continue and worcke in theire trade to the benefitt of this Defendaunte in the house of this Defendaunte duering the space of twoe yeares or thereaboute*s* after the said Marriage this Defendaunte giveinge them Conveniente housrome and dayate Convenient for them so that this Defendaunte might only haue the benifitt of theire laboure*s* Then this Defendaunte at the end of the sayd twoe yeare*s* would give vnto the sayd Complainaunte fiftie pounde*s* or to that effect as this Defend^t^ nowe remembreth aft^r^ which time the sayd Complaynaunte did for a little time remayne in the house of this Defendaunte accordingly But after the sayd Complaynaunte and his wife had stayed in the house of this Defendaunte as aforesayd the space of halfe a yeare or there aboute*s* he refused to stay there any longer and would neede*s* take oth^r^ Courses for his better pr*e*fermente as he then pr*e*tended And at the end of the sayd halfe yeare when the said Compl^t^ Did departt from the house of this Defendaunte out of his love to the sayd Complainaunte and his wife (beinge no other way Compellable thervnto) did bestowe on them a good proportion of houshoulde stuffe and the thinge*s* Concerninge theire trade according to this Defendaunte*s* poore ability being to the vallue of Twenty pounde*s* or theraboute*s* and lykewyse ten pounde*s* of ready mony to put into theire pursse and did hartely desier theire welfare and lykwise did Intende to leave vnto the sayd Complaynaunte and his wife beinge the only chylde of this Defend-

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aunte all or the moste parte of that estate which god should have blessed them with at the time of his Death And allso in his fatherly love to have ben helpfull to them from time to time accordinge to his poore abillity After which time (y^t^ the said Complainaunt was gon from the house of this Defendaunt) about a yeare This Defendauntes wife dyed and then the said Complaynaunte and his wife Came againe and lived wth this Deffendaunte as partneres in ther sayd trade of Tyeringe about the space of half a yeare duering which time this Defendaunte had in his handes the summe of forty shillinges of the Complaynauntes mony and at the end of the said Halfe yeare & about the time of the Complaynauntes depareture from this def^tes^ house the sayd Complaynaunte being Indebted vnto a Bruer the summe of three poundes desiered this Defendaunt to pay it for him to the sayd Bruer which sayd somm of three poundes this Defendaunte payed for the sayd Complaynaunte accordingly but this def^t^ was nev^r^ sithenes repaide the said 3^li^. or any parte therof other then the said 40^s^ as aforsaid. and dueringe the sayd half yeare that the Complaynaunt was with this Defendaunte as aforesayd this Defendaunte did buy into the shopp with his owne mony silvered wyer and oth^r^ Comodyties Concerninge theire trade to the vallue of Ten poundes or theraboutes for which the sayd Complainaunte should by agreemente have payd halfe but did pay never a peny And this Defendaunte absolutely denyeth that he did ever to his knowledge offer vnto the sayd Complaynaunte in marryage wth his daughter the summe of Threescore poundes or any portion or other somme whatsoever other than the sayd summe of ffifty poundes at the end of the foresayd three yeares and vpon the Consideration as before is expressed And this Defendante lykewyse denyeth that he did ever promise to leave to the sayd Complainaunte and his wife at his Death the some of two hundred poundes or any other Certaine summe but as aforesayd did Intende to deale with the Complaynaunt and his wife at the time of his Death as it is fittinge for a father to deale with his only Chylde But this Defendaunte neither then Coulde nor yet Canne set dowe any Certaynty thereof for that this def^t^. both then was and yet is

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a poore man and knows not howe it will please god to blesse him in his estate at the time of his Death nor how the sayd Complaynaunte and his wife will behave themselues towardes this Defendaunte In his life time wherby they may deserve this Defendauntes either more or lesse affection and love towardes them. And this defendaunt lykewyse denyeth that he to his knowledge doth owe the Complaynaunte forty shillinges or any other former somme of Mony whatsoever otherwyse than as before is expressed An this Defendaunte further saith that he did about a month sythence earnestly request the sayd Complaynaunte in the presence of his neighboures to account wth him for the sayd Reckoninge betweene them at which time the sayd Complaynaunte did give this Defendaunte Ill Languages and bid him Come by his mony howe he Coulde Without that that any other matter or thing Contained in the sayd Bill of Complaynt materiall or effectuall to be answered vnto and not heerin sufficiently Confessed and avoyded denyed or traversed is true All which matters this Defendante is ready to averr and prove as this most honorable Court shall award and humbly prayeth to be dismissed out of the same with his reasonable Chardges in this behalfe most wrongfully sustayned/

Geo: Hartoppe

[9]

REPLICATION.

Quinto die Maij Anno *Regni Regis* Jacobi Angliae &c x° et Scotiae xlv°/.

The Replicacion of Stephen Belot Comp^lt^ to the Answer of Christopher Mountioye def^t^.

The said Comp^lt^ not Confessinge or acknowledginge anie matter or thinge materiall or effectuall in the said def^tes^ Answer conteyned to be true in suche sorte manner or forme as in and by the said bill they are sett forthe and declared sayth that the said Answer is in all or the moste parte thereof vntrue incerteyne and insufficient to be replyed vnto for manie imperfeccions in the

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same appearinge All the advantages of excepcion to thincertaintyes and insufficiencies whereof nowe and at all tymes hereafter to this Compl^t. saued, This Compl^t. for Replicacion sayeth in all thinges as in his said Bill of Complainte he hathe sayed, and doth and will auer maynteyne iustyfie and proue his said Bill of Compl^t. and euerie matter article and allegacion therein Conteyned to bee true Certayne and sufficient to be answered vnto set forthe and declared w^thout that that this Compl^tes ffrends at the tyme of his Commynge to bee Apprentice wth the said def^t did promise to finde this Compl^t. Convenient apparrell while he shoulde Contynewe in the said def^tes service Or that the said def^t at the tyme of this Compl^tes trauaile into spayne did furnishe this Compl^t. wth six poundes or wth any other somme of Money but that this Compl^t. was only therein furnished by himselfe w^thout that that allsoe this Compl^t. moved the said def^t or his wyffe for theire Consentes to the Mariage of the said Mary but that this Compl^t. was only drawen therevnto by the said def^t, And w^thout that that after the Marriage of this Compl^t. wth the said Mary there was any suche Conclucion or agreement made betwixt the said def^t and this Compl^t. euer receiued any goodes or howsehold stuffe of the said def^t or any things Concerninge theire trade, or desiered the said def^t to pay the somme of three poundes or any other somme to the Brewer, or was soe indebted vnto the said Brewer as by the said Answere all soe is alleadged, wth that that the said def^t did promise vnto this Compl^t. the somme of threscore pounds in mariadge wth the said Mary his daughter and did likewise promise to leaue vnto this Compl^t. and his wyffe the some of two hundred poundes or thereaboutes after his deceasse, And that the said def^t is truely indebted vnto this Compl^t. in the somme of fforty shillinges w^thout that that this Compl^t. was desiered by the said def^t to come to anie accompte or gaue the said def^t any ill languages as in & by the said Answere is allsoe Alleadged, And w^thout that that any other matter thinge or thinges Clause sentence, Article or allegacion in the said Answere Conteyned materiall or effectuall in the lawe to be replyed vnto, and not heerein sufficiently replyed vnto Confessed

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and avoyded denyed or trauersed is true, All and euery wch matters hee this Comp^lt^. is ready to averr iustify mayntayne and proue as this honorable Courte shall award, And humbly prayeth as hee before by his said Bill of Complaynte hathe allready prayed./

Raf Wormlaighton

[10]

REJOINDER.

[No date.]

The reioy*nd*^r^ of Christopher Mountioy defendn^t^ to the Replica*cion* of Stephen Belot Compla*inant*

The sayd Defendaunte not acknowledgeing any thing in the sayd Replecation materially alledged to be trew in such sort as in and by the sayd Replication is aledged for reioynd^r^ thervnto sayth in all thing*es* as in his Aunsweare he hath sayd and doth and will averr mayntayne and prove his sayd Aunsweare and every matter Artickle and thinge therein Contayned to be true Certaine and sufficient to be Replyed vnto in man*ner* and forme as therein is sett forth affirmed and Declared with that that this Defendaunt will mayntaine and prove that the sayd Complainnant*es* frend*es* did promis to fynde the sayd Complaynaunte apparrell as in and by this Defendaunt*es* aunsweare is affirmed and that this Defendaunt did furnish the sayd Complainaunte with mony at the time of his travell*es* into Spayne and that this Defendaunte and his then wife was then moved and and earnestly solisited by the sayd Complaynaunte to Consente to his Maryage of theire Daughter and the Complainanaunte not drawene therevnto by this Defendaunte, and that this Defendaunte did give vnto the sayd Complainaunte houshould stuffe and oth^r^ good*es* and Did make such Conclusion*es* and agreement*es* wth the sayd Compla*in*ante as in and by the sayd aunsweare is truly affirmed and this Defendaunte was also desiered by the Complaynaunte to pay vnto the Bruer three pound*es* for the Debt of the sayd Complaynaunt and payd it as in his sayd Defendaunt*es* Aunswer

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is lykewyse most truly affirmed w^th^out that that this Defendaunte did ev^r^ p*ro*mise thr̃ee score pound*es* or any other somes of mony vnto the sayd Complainaunte eith^r^ in marriage with his sayd Daughter or after his Death or is indebted vnto the Complaynaunte in the som*m*e of fforty pound*es* or any other some what soever as in and by the sayd Bill and Replication is falsly surmysed all which matters this Defendaunte is ready to averr maynetayne and prove as this Honorable Courte shall award and humbly prayeth as in his sayd Answeare he hath prayed.

George Hartoppe

[11]

Process Book, 6–11 James I, Miscellaneous Books, vol. 183, fo. 269.

[Summons to Shakespeare and others, Easter Term, 10 James I.]

Septimo die Maij/

Nil paup*er*	A compulsory to Will*iam* Shakespeare gent and others ad testificand*um* inter Stephan*um* Bellott q*uerentem* et Xpoferum Mountioy de*fendentem*	r Imed

[The note of "nil pauper" refers to the complainant. The note at the right means "returnable immediately."]

[12]

Witness Book, 44 Elizabeth to 16 James I, Miscellaneous Books, vol. 199.

[Shakespeare and others in the Court's list of witnesses examined *ex parte* Belott, Easter term, 1612.]

Stephen Belott	danyell Nicholas
pl*aintiff*	Johan Johnson vx*or*
XpoferMountioy	Tho: Johnson
def^t^.	Will*iam* Shakespeare gent

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[13]

INTERROGATORIES.—FIRST SET.

[*Ex parte* Belott, for 11 May, 1612. Written on parchment, and attached to the following "paper" depositions.]

Jnterrogatories to bee mynistred to Wittnesses to bee p*ro*duced on the parte and behalf of Stephen Belott Complt. against Christopher Mountioye Deft.

1 Jmprimis whether doe you knowe the parties plt. and deft. and howe longe haue you knowne them and either of them.

2 Jtem whether did you knowe the Complt when he was servant wth the said deft howe and in what sort did he behaue himselfe in the service of the said deft and whether did not the said deft. Confesse that hee had got great p*ro*fitt and Comodytie by the service of the said Complt.

3 Jtem whether did not the said deft seeme to beare great good will and affeccione towarde*s* the said Complt during the time of his said service and what report did he then giue of the said Complt touching his said service and whether did not the said deft make a mocion vnto the said Complt of marriage wth the said Mary in the Bill mencioned being the said deft*es* sole Child and daughter and willingly offer to p*er*forme the same yf the said Complt. should seeme to be content and well lyke thereof. and whether did not hee lykewise send anie p*er*son or noe to p*er*swade the said Complt. to the same. declare the truthe of yor knowledge herin.

4 Jtem what some or somes of moneye did the said deft p*ro*mise to giue the said Complt. for a porcion in marriage wth the said Marye his daughter whether the some of threscore pownde*s* or what other somme as you knowe or haue hard and when was the same to be paied whether at the daie of Marriage of the said Complt and the said Marye or whath other tyme and what further porcion did the said deft p*ro*mise to giue vnto the said Complt wth the said Marye at the tyme of his decease whether the some twoe hundred pounde*s* or what other somes and whether vppon the

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said p*er*swac*i*ones and promisses of the said deft. did not the said Complt shortly after marrye wth her the said Marye declare the truthe herein as you knowe verylie believe or haue Credybly hard.

5/ Item what p*ar*cells of good*es* or houshold stuffe did the defendt promise to geue vnto the compl*ainant* in Marriadge wth his said wiefe And what p*ar*cells of good*es* did he geue him in Marriage wth his said wyffe. did he not geue them these p*ar*cels (vizt.) One ould ffetherbed, one oulde ffether boulster, A flocke boulster, a thine greene Rugg, two ordanarie blanckett*es* woven, two paire sheetes, A dozine of napkines of Course Dyap*er*, twoe short table Clothes, six short Towelles & one longe one, An ould drawinge table, two ould Joyned stooles, one Wainscott Cubberd, one Twistinge wheele of woode, twoe paire of litle Scyssers, one ould Truncke and a like ould Truncke./ One Bobbine box: And what doe youe thincke in yor Conscyence all these said parcelles might be woorthe at the tyme when they weare deliu*er*ed by the defendaunt*es* appoyntm^t^, vnto the pl*aintiffes* declare the truthe hearein at lardge./

[14–16]

DEPOSITIONS.—FIRST SET.

[*Ex parte* Belott, 11 May, 1612. Written on paper sheets 12¼ × 15¾, and attached to the preceding skin of interrogatories.]

Depositione*s* Capt*ae* ap*ud* Westm*onasterium* vndecimo die maij A*nn*° Regni Jacobi R*egis* Angl*iae* &c decimo et Scot*iae* xlv^to^ ex p*ar*te Stephanei Bellott q*uaerentis* vers*us* Christopheru*m* Mountioye de*fendentem*

[14]

Johane Johnsone the wyffe of Thomas Johnsone of the p*ar*ishe of Elinge in the Countye of Midd*lesex* Baskettmaker of the Age of ffortye yeres or th^r^aboute*s* sworne and examyned the daye and yere abouesaid deposeth and say[th]

1/ To the ffirst Jnterr*ogatory* this depone*nt* sayth she knoweth the pl*aintiff* and [hath] knowne him about Eight yeres./ and the deft about Eight yeres./

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2/To the seconde Jnterr this depont sayth shee did knowe the pl*aintiff* when he served the deft, And sayth he behaved him selfe well and in good sorte when he served the defendt for shee was servant to the deft at the tyme./ but shee never herd the deft confesse and saye that he had greate p*ro*ffitt and Comoddytie by the pl*aintiffes* service./ And more shee cannot depose.

3/To the thirde Jnterr*ogatory* this depon*ent* sayth that the defendt seemed to beare greate good will and affection towards the pl*aintiff* when he served him, geuinge him reporte to be A verry good servaunte for pl[ ] his service./ But that the deft moved the pl*aintiff* to Marrye wth his daughter Marye she knoweth not./ But sayth that there was a shewe of goodwill betweene the pl*aintiff* and deft*es* daughter Marye wch the deft*es* wyffe did geue Countenaunce vnto and thinke well of./ And as shee Remember*e*th the deft did send and p*er*swade one Mr Shakespeare that laye in the house to p*er*swade the pl*aintiff* to the same Marriadge./ And more shee cannott depose

4/To the iiijth Jnterr*ogatory* this depon*ent* sayth shee never herd her [M^{r}] the de*fendant* p*ro*ffer the pl*aintiff* any some of money in Marriadge [wth] his daughter Marye. but yt was Reported in the house that the pl*aintiff* was to haue wth her in marriadge the some of ffyftye pound*es*. but what tyme of paym^{t} was th^{r}of appoynted or agreed vppon shee knoweth not, nor of any p*ro*mise of any other or furth^{r} porc*i*on to be payed the pl*aintiff* eyther at the tyme of marriadge betweene them, or at the tyme of the deft*es* deceas[e] but [that] they after married togeathe^{r}./ And more shee cannott [depose]

5/To the vth Jnterr this depon*ent* sayth shee knoweth not what p*ar*celles of good*es* and houshould stuffe the defendt p*ro*missed to geue vnto the pl*aintiff* in marriadge wth his wyffe./ But sayth the deft gaue in marriadge wth her to the de*fendant* [sic] the seu*er*all p*ar*cells [of] good*es* in the Jnterr*ogatory* mencioned./ but the valewe of them she certaynlie knoweth not, but thinketh they were woorth some Eight pound*es*./ or thereabout*es*./ And more shee cannot depose./

X [Her Mark]

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[15]

Danyell Nycholas of the parishe of S^ct^: Olphadge w^th^in Criplegate London gent of the Age of ffyftye twoe yeres or th^r^about*es* sworne and examyned the daye and yere aboue said deposeth and sayth

1/To the ffirste Jnterr this deponent sayth he hath knowne the pl*aintiff* about twenty yeres and deft about twelue yeres

2/To the seconde Jnterr*ogatory* this deponent sayth he knewe the pl*aintiff* servaunte vnto the def*endant* who behaved him selfe verry well in the defendant*es* service for any thinge he eu*er* herd to the contrary· And hath herd that the deft p*ro*fitted well by the plt*es* service wth him. And more he Cannott depose./

3 To the thirde Jnterr*ogatory* this deponent sayth he herd one W^m^: Shakespeare saye that the deft did beare A good opinnion of the pl*aintiff* and affected him well when he served him, And did move the pl*aintiff* by him the said Shakespeare to haue [a] marriadge betweene his daughter Marye Mountioye [and] the pl*aintiff* And for that purpose sent him the said Sh[akespeare] to the pl*aintiff* to p*er*swade the pl*aintiff* to the same, as Shakespere tould him this deponent wch was effected and Solempnized vppon p*ro*mise of a porcion wth her./ And more he cannott depose./

4 To the iiij^th^ Jnterr*ogatory* this deponnt sayth that the pl*aintiff* did Requeste him this deponnt to goe wth his wyffe to Shakespe[are] to vnd^r^stande the truthe howe muche and what the def*endant* did promise [to] bestowe on his daughter in marriadge wth him the pl*aintiff*, who did soe./ And askinge Shakespeare th^r^of, he Answered that he promissed yf the pl*aintiff* would marrye wth Marye his the deft*es* onlye daughter, he the defendt would by his p*ro*mise as he Remembered geue the pl*aintiff* wth her in marriadge about the some of ffyftye pound*es* in money and Certayne Houshould stuffe./ And more he cannott depose touchinge the said Interr*ogatory* to his Rememberaunce for he remembereth not any daye sett downe for payni^t^ of the porcion or deliu*er*ye of the houshould Stuffe. but only that he would geue her soe much at the tyme of her marriadge./

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5/ To the vth Jnterr*ogatory* this depon*ent* Can saye nothinge more then he hath alreddye deposed./

Daniell Nicholas

[16]

Will*iam* Shakespeare of Stratford vpon Aven in the Countye of Warwicke gen*tleman* of the Age of xlviij yeres or thereabout*es* sworne and ex*am*ined the daye and yere abouesaid deposethe & sayethe

1 To the first Jnterr*ogatory* this depon*ent* sayethe he knowethe the p*ar*tyes pl*aintiff* and deffendt and hathe know[ne] them bothe as he now remembrethe for the space of tenne yeres or thereabout*es*./

2 To the second Jnterr*ogatory* this depon*ent* sayeth he did know the comp^t^ when he was s*er*vant wth the deffendant, and that duringe the tyme of his the complt*es* service wth the said deffendt he the said Complt to this depon*entes* knowledge did well and honestly behaue himselfe, but to this depont*es* remembrance he hath not heard the deffendt confesse that he had gott any great p*ro*ffitt and comodytye by the s*er*vice of the said compl*ainant*, but this depon*ent* saith he verely thinckethe that the said compl*ainant* was a very good and industrious servant in the said s*er*vice And more he canott depose to the said Jnterr*ogatory*:/

3/ To the third Jnterr*ogatory* this depon*ent* sayethe that it did evydentlye appeare that the said defft did all the tyme of the said complt*es* service wth him beare and shew great good will and affeccion towards the said complt, and that he hath hard the defft and his wyefe diu*er*se and sundry tymes saye and reporte that the said complt was a very honest fellowe: And this depont sayethe that the said deffendant did make a mocion vnto the compl*ainant* of marriadge wth the said Mary in the bill mencioned beinge the said defft*es* sole chyld and daughter and willinglye offered to p*er*forme the same yf the said Compl*ainant* shold seeme to be content and well like thereof: And further this depon*ent* sayethe that the said defft*es* wyeffe did sollicitt and entreat this depon*ent* to moue and p*er*swade the said Compl*ainant* to effect the said

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Marriadge and accordingly this depon*ent* did moue and p*er*swade the compl*ainant* thervnto: And more to this Jnterrogat*or*ye he cannott depose:/

4/ To the ffourth Jnterr this depon*ent* sayth that the defendt p*rom*issed to geue the said Compl*ainant* a porc*i*on [*of monie and goodes* (stricken out in original)] in Marriadg[e] wth Marye his daughter./ but what c*er*tayne porc*i*on he Rememb*er*ithe not./ nor when to be payed [*yf any some weare promissed,* (stricken out in original)] nor knoweth that the de*fendant* p*rom*issed the [*defendt* (stricken out)] pl*aintiff* twoe hundered pound*es* wth his daughter Marye at the tyme of his decease./ But sayth that the pl*aintiff* was dwellinge wth the de*fendant* in his house And they had Amongeste themselues manye Conferences about there Marriadge w^{ch} [afterwardes] was Consumated and Solempnized. And more he cann[ott depose./]

5/ To the vth Jnterr*ogatory* this depon*ent* sayth he can saye noth[inge] touchinge any p*ar*te or poynte of the same Jnterr*ogatory* for he knoweth not what Jmplen^{tes} and necessaries of household stuffe the de*fendant* gaue the pl*aintiff* in Marriadge wth his daughter Marye./

Willm Shak*sper*

[On Shakespeare's signature here, see my article in the *Nation*, 17 March, 1910, or the *Westminster Gazette*, 12 March.]

[17]

Decrees and Orders, Miscellaneous Books, vol. 26, p. 270.

[An order for publication of the preceding depositions and for hearing the case, dated 15 May, 1612.]

Decimo quinto die Maij A*nn*° R*egni* R*egis* Jacobi Angliae ffranciae et hib*er*niae decimo et Scotiae xlv^{to}./

Bellot Mountioy

In the cause at the sute of Stephen Bellot compl*ainant* against Xpofer [= *Christ*ofer] Mountioy def^{t} vpon the mocion of Mr Wormeleighton of counsaill wth the said compl*ainant* yt is ordered that the same matter shalbe published vpon Wednesday next if

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then or in the meane time no matter sufficient shalbe shewed in this court in stay thereof, and it shalbe heard in this court vpon the second day of the next terme (the def^{t} having convenient notice of this order before the said day of hearing).

[18]

Decrees and Orders, Miscellaneous Books, vol, 26, p. 343.

[An order for examining further witnesses and for postponing publication and hearing, dated 15 June, 1612.]

15° Junij A° 10° et 45°

Bellot Mountioy In the cause at the sute of Stephen Bellot compl*ainan*t against Xpofer Mountioy def.^{t} vpon the mocion of m^{r} Wormeleightin of counsaill wth the said compl*ainan*t it is Ordered (any form*er* order notwthstanding) that both the said p*ar*ties shall haue further day to examine all such witnesses as they intend to vse in this cause, vntill saterday next, And then the same matter shalbe published and not before & it shalbe heard in this court vpon the saterday next before thende of this p*re*sent terme p*er*emptorily.

[19]

Witness Book, 44 Elizabeth to 16 James I, Miscellaneous Books, vol. 199.

[The Court's list of witnesses examined *ex parte* Bellott, Trinity Term, 1612.]

Stephen Bellott *plaintiff*	Humfrey ffludd
	danyell Nich*o*las
	George Wilkins
	Will*ia*m Eaton
Xpofer Mountioy deft.	Xpofer Weaver
	Nowell Mountioy

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[20]

INTERROGATORIES.—SECOND SET.

[*Ex parte* Belott, for 19 June, 1612. Written on parchment, and attached to the following set of depositions.]

Inter to bee mynistred to witnesses to bee produced on the parte and behalfe of Stephen Bellott Compl^t^ againste Christopher Mountioy def^t^.

1 Inprimis whether doe you knowe the parties pl^t^. and def^t^ and howe longe haue you knowen them and ither of them?

2 Itm of what estate or abillity is the said def^t^ accompted to bee of and what Lease or Leases of howses or tenementes hathe hee, and where doe the said howses or tenementes lye, and what is the yeerely vallue thereof? and what tyme or tymes are to come in the said Leases and whether doe you not thinke that the said def^t^ receiueth fforty pounds per annum de claro by his said Leases? or howe muche dothe hee receiue by the same as you haue Credibly heard or verily beleeue in yor Conscience to bee true, and whether hathe not the said def^t^ giuen forthe speaches that hee will rott in prison before hee will giue any thinge vnto the said Compl^t^ yf the Cause should bee decreed agaynste him in this honorable Courte declare the truthe of yor knowledge herein as you knowe verily beleeue or haue Credibly heard./

Humphrey flude 3 Itm who apparelled the said Compl^t^. duringe the tyme of his seruice wth the said def^t^? whether not the ffrends of the said Compl^t^. and for howe longe tyme did the said Compl^tes^ ffrendes soe fynde him wth apparell? whether not duringe the terme of two yeares or howe muche longer declare the truthe of yor knowledge therein.

4 Itm whether did not the said def^t^ or some other by his appointment send you or any other person to yor. knowledge vnto the said Compl^t^. to make a mocion of marriadge betwixt the said Compl^t^. and the said Mary Mountioy beinge the def^tes^ sole Childe and daughter, and what wordes did the said def^t^ vse vnto you or

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to any other to yor. knowledge touchinge the marryage of the said Comp^lt. wth the said Mary? whether did not the def^t then say that yf shee the said Mary did not marry the said Comp^lt., that
William Shakespeare 4. shee the said Mary should not Coste him nor haue a groate from him, and whether did not the said def^t likewise promise that yf the Comp^lt. and the said Mary did marry together then hee would giue a porcion wth the said Mary vnto the said Comp^lt.? howe muche was the said porcion that hee then promised, whether not the somme of threescore pounds or what other somme as you thinke in yor. Conscience to bee true? and before whome did the said def^t soe promise the same, whether before you or any other to yor. knowledge, and whether vppon the said promisses and perswac*ions* did not the said Comp^lt. Contracte himselfe wth the said Mary?

George Wilkins 5 Itm whether after the marriadge betwixt the said Comp^lt. and the said Mary did the said def^t giue any goods or howsehold stuffe to the said Comp^lt. and his wyffe? yf yea, to what vallue did the said goods or howsehold stuffe amounte vnto, whether vnto the somme of ffiue pounds or to what other somme declare the truthe of yor. knowledge herein./

[21-26]

DEPOSITIONS.—SECOND SET.

[*Ex parte* Belott, 19 June, 1612. Written on paper 12¼ × 15¾, and attached to the preceding skin of interrogatories.]

Depositione*s* Capt*ae* ap*ud* Westmo*nasterium* decimo nono die Junij A*nn*° Regni Jacobi Re*gis* Angl*iae* &c decimo et Scot*iae* xlv^to^: ex p*ar*te Stephani Beliott q^rt vrs Christopheru*m* Mountioye deft

[21]

Dannyell Nicholas of the p*ar*ishe of S^ct^: Alphadge w^th^in Criplegate London gent of the Age of threeschore and twoe yeares or thereabout*es* swoorne and examyned the daye and yeare abouesaid deposeth and saythe./

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1/ To the ffirste Interr this deponent sayth he hath knowne the plaintiff twelue yeares, and the defendt about twentye yeares.

2/ To the seconde Interr this deponent sayth that the defendt is Amongest his neighboures thought to be a Suffitient man in estate and abillitie, and Reporte is amongste the neighboures that he hath Diuerse leases neere about wheare he dwelleth and at Braynforde woorthe by reporte thirtye poundes per Annum or thereaboutes. And by reporte he hath latelie takne newe leases of them./ but what yeares are yett to come in them his leases this deponent knoweth not./ And sayth he thinketh in his Conscyence the defendt Receiveth about thirtye poundes yerely Rent de Claro for the same houses/ And sayth he herd one Christopher Weaver saye that the defendt hadd A good estate to paye euerye man his owne and to geue the plaintiff his porcion yf he pleased./ but the defendt hadd made an othe that Althoughe the Lawe gaue him the plaintiff his porcion, he the deft would Rott in prison before he would geue the plaintiff any one groate thereof./ And more he Cannott depose ·

3/ To the thirde Interr this deponent sayth that the pltes ffathr in Lawe Humphrey ffludd, reported in this deponentes presentes & the presentes of others that he the plaintiff was often and seuerall tymes Apparrelled by him the said Homphrey ffludd and the plaintiffes mother and others of the plaintiffes ffrendes, duringe the moste parte of the tyme of his service wth the defendt./ And more he cannott depose touchinge the same Interr./

4 To the iiijth Interr this deponnt sayth that the defendt did never send him this deponnt vnto the Complainant to make mocion of Marriadge betwixte the Complainant and the said Marye Mountioye beinge the defendtes sole daughter and Childe but Mr: William Shakespeare tould him this deponent that the defendt sent him the said Mr Shakespeare to the plaintiff about suche a marriadge to be hadd betweene them, And Shakespeare tould this deponent that the defendt tould him that yf the plaintiff would Marrye the said Marye his daughter he would geue hime the plaintiff A some of money wth her for A porcion in Marriadge wth her./ And that yf he the plaintiff did not marry wth her the

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said Marye and shee wth the pl*aintiff* shee should never coste him the deft her ffather A groat, wherevppon And in Regard Mr Shakespeare hadd tould them that they should haue A some of money for a porc*i*on from the fath^r^ they weare made suer by Mr Shakespeare by geuinge there Consent, and agreed to Marrye, [*geuinge eache others hand to the hande* (stricken out in original)] And did marrye./ But what some yt was that M^r^ [*Shake* (stricken out)] Mountyoye p*ro*missed to geue them he the said Mr Shakespeare could not remember, but said yt was ffyftye pound*es* or th^r^about*es* to his beste Remembe*r*aunce./ And as he Remembe*r*ith Mr Shakespeare said he p*ro*missed to geue them A porc*i*on of his good*es*: but what, or to what valewe he Rememberithe not/ And more he Cannott depose./

5 To the vth Interr this depon*e*nt sayth that after the Marriadge Solempnized betweene the pl*aintiff* and Marye, one George Wilkins tould him this depon*e*nt that the defendt gaue them some Implem^tes^ belonginge to household, wch good*es* weare in his the said Wilkins Custody, wch good*es* the said Wilkins Reported he would not haue geuen ffyve pound*es* ffor./ And more he cannott depose

Daniell Nicholas

[22]

William Eaton apprentice wth the Compl*ainant* of the Age of nynteene yeres or th^r^about*es* sworne and examyned the daye and yere abouesaid deposeth and saythe./

1/ To the ffirste Interr this deponnt sayth he hath knowne the plt ffyve yeres or th^r^about*es*. And the def*endant* about ffoure yeares and A halfe./

2/ To the seconde Interr this depon*e*nt sayth he cannot c*er*taynlie depose any thinge touchinge the deft*es* estate or habillitie. only sayth he knoweth the deft hath A house in Muggle streete & in Silver Streete London and another at Branforde, but what they are woorth by the yeare he knoweth not./ nor hath herd the deft vse any such speeches as in the Interr*ogatory* is vrdged/ And more he Cannott depose.

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3 To the thirde Interr this deponent Can saye nothinge./

4 To the iiijth Interr this deponent sayth he hath herd one Mr Shakspeare saye that he was sent by the defendt to the pl*aintiff* to moue the pl*aintiff* to haue A marriadge betweene them the pl*aintiff* and the defendt*es* daughter Marye Mountioye, And herd Mr Shakespeare saye that he was wished by the deft to make p*r*offer of A certayne some that the defendt said he would geue the pl*aintiff* wth his daughter Marye Mountioye in Marriadge, but he had forgott the some./ And [*m^{r} Shakespeare tould the plt* (stricken out in original)] more he cannott depose touchinge the same Interr*ogatory*./

5/ To the vth Interr this deponnt Can saye nothinge of his owne knowledge nor by Credible reporte./

william Eyton

[23]

George Wilkins of the p*ar*ishe of S^{ct}. Sepulchers London Victuler of the Age of thirtye Syxe yeres or th^{r}about*es* sworne and examyned the daye and yere abouesaid deposeth and saythe./

1/To the ffirste Interr this deponent sayth he hath knowne the pl*aintiff* about Seaven yeres and the deft as longe./

2. 3. 4./To the second, third and ffourth Interr this deponent is not examyned at the Requeste of the pl*aintiff*./

5 To the vth Interr this deponent sayth that after the plt was married wth Marye the deft*es* daughter he the pl*aintiff* and his wyffe came to dwell in this deponnt*es* house in one of his Chambers. And brought wth them A fewe good*es* or houshould stuffe wch by Reporte the defendt her fath^{r} gaue them, ffor wch this deponent would not haue geuen Aboue ffyve pound*es* yf he had bene to haue bought the same./ And more he cannott depose touchinge the same Interr:/

George Wilkins

[24]

Humfrey ffludd of the p*ar*ishe of S^{ct}: Gyles wthout Criplegate one of his Matie: Trumpetores of the Age of ffyftye three yeres or

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th^r about*es* sworne and examyned the daye and yere abouesaid deposeth and saythe

1/To the ffirste Interr this depon*e*nt sayth he hath knowne the pl*aintiff* about Eighteene yeares for he married his mother in ffraunce And the defendt he hath knowne about Eighteene yeres for he put the pl*aintiff* to be the defendt*es* apprentice./

2/To the seconde Interr this depon*e*nt is not examyned at the Requeste of the plt./

3/To the thirde Interr this deponnt sayth that whileste the pl*aintiff* was in service wth the defendt, this depon*e*nt gaue the pl*aintiff* three suyt*es* of Apparrell vz twoe Cloak*es*, And three suyt*es* of Apparrell. And his mother gaue him good store of Lynnen wch apparrell and lynnen Could not serve him lesse than three yeres, besid*es* the deft was so Stricte vnto him that he this depon*e*nt and the pl*aintiffes* mother weare fayne manye tymes to geue him monney and to paye the Barber for Cuttinge the hayr of his heade./ And more he cannott depose./

4. 5/To the iiij^th^ and v^th^ Interr this depon*e*nt is not ex*a*m*i*ned at the Requeste of the pl*aintiff*./

Homfrey Fludd

[25]

Christopher Weaver of the p*a*rishe of S^ct^: Olaves in Sylver Streete London m*e*rcer of the Age of thirty Eight yeres or thereabout*es* sworne and examyned the daye and yeare abouesaid deposith and sayth

1/To the ffirste Interr this deponnt sayth he hath knowne the pl*aintiff* about twelue yeres and the deft about Syxteene yeares./

2/To the seconde Interr this depon*e*nt sayth he knoweth not the deft*es* Estate, but sayth he hath the lease of his house wherin he dwelleth And A lease of A house in Braynford in the County of Midd*lesex* But he knoweth the deft hath lyen at Intereste these three or ffoure yeres for twenty pound*es* in one place, and hath neyther payed the principalle nor Interest money due for the same./ And lykewise hath takne vpp other monney, And soulde his plate and some houshould stuffe./ And furth^r^ sayth

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that he herd that the deft payeth yerelye Rent for those leases some Seaventeene pound*es* p*er* Ann*um*./ And sayth that he thinketh the deft Receaveth some Eighteene pound*es* p*er* Ann*um* de Claro besid*es* his owne dwellinge and hath A Soiourner in his house wth him b*ut* what p*roffitt* he maketh th^{r}by he knoweth not./ And sayth the deft hath said in this deponnt*es* hereinge that in Regard the pl*aintiff* and his daughter had vsed him so vnkindlie, And in Regard he p*romissed* them nothinge he would Rather Rott in prison then geue them any thinge more then he had geuen them before/ And more he cannot depose./

3 To the thirde Interr this depon*ent* sayth he hath herd the deft saye that after the pl*aintiff* came to be his apprentice he ffound the pl*aintiff* all his wearinge apparrell. And oth^{r}wise he Cannott depose touchinge the same Interr./

4 To the iiijth Interr this depon*ent* sayth he was never made an Instrum^{t} betweene the pl*aintiff* and the deft by the deft*es* ap-poyntm^{t} for the moveinge of A marriadge betweene the pl*aintiff* and deft*es* daughter And more he cannott depose touchinge any p*ar*te of the same Interr for that he never herd the deft p*romise* the pl*aintiff* any some of monney or other thinge wth his daughter Mary in Marriadge wth the pl*aintiff* nor saye that yf she married not the pl*aintiff* shee should not coste him A groate/

5 To the vth Interr this depon*ent* sayth he hath herd the deft and his wyffe saye that they gaue the pl*aintiff* wth there daughter Marye in marriadge the some of ten pound*es* in monney and houshould Stuffe of moste sort*es* somthinge viz in monney and good*es* to the valewe of thirtye pound*es* And more he Cannott depose to his Remembr*aunce*/

Chr: Weauer:

[26]

Nowell Mountioye of the p*ar*ishe of S.^{ct} Olaves in Sylver Streete London Tyremaker of the Age of thirtye yeares or th^{r}about*es* sworne and examyned the daye and yeare abouesaid deposith and saythe./

1/To the ffirste Interr this depon*ent* sayth he hath knowne the

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pl*aintiff* about ffyfteene yeres and the deft longer for he is this depon*entes* brother./

2/To the seconde Interr this depon*ent* sayth that his broth^{r} the deft*es* estate is not muche ffor he hath but the lease of twoe houses one lease of the house wherein he dwelleth devided into twoe tenem*entes* and a lease of a house in Brainforde by wch leases he gaineth An ou*er*plus of Rent more then he payeth to the valewe of about nyntene or Seaventeene pound*es* p*er* Ann./ And hath A tyme in his lease of the howse wherein he dweleth of some thirty yeres to come wch he renewed but latelie, but howe longe tyme he hath to come in the house he hath at Brainford he knoweth not./ Albeyt the deft is much in debte, And sould or pawned his plaite A greate whileste sync so that his estate cannot be verry greate./ And sayth that he herd his brother the deft saye that yf he weare Condempned in this suyte vndeserved he would lye in prison before he would gyve the pl*aintiff* any thinge./ And more he Cannott depose./

3./To the thirde Interr this depon*ent* sayth that the pl*aintiff* was A yeare A boorder in the deft*es* house before he became the deft*es* Apprentice duringe wch tyme he beleveth the deft did not apparrell the pl*aintiff:* but after the pl*aintiff* became the deft*es* s*er*vaunte the deft apparrelled him Albeyt his ffrind*es* might send him somtymes A Cloake or payre of Stocking*es* or such a thinge./ wch he knoweth to be true for that he did s*er*ve the deft when the plt served him. And knewe the truth th^{r}of: And more he Cannott depose./

4/To the iiij^{the} Interr this depon*ent* sayth he was never sent by the deft vnto the Complt to make A mocon to him of A marriadge to be hadd betwixte the Compl*ainant* and Marye Mountioy the deft*es* sole Child and daughter, nor knoweth of any other that was by the defendt sent vnto the pl*aintiff* vppon that messaiege: but the plt tould this deponnt that one Mr Shakespeare was Imployed by the deft about that buysnes: in what mann^{r}: or to what effecte he knoweth not: And sayth he never herd the deft saye that yf his daughter Mary married not wth the pl*aintiff* shee should neve^{r} haue groate from him./ nor knoweth that the de-

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f*endant* p*ro*missed to geue the pl*aintiff* Any porcion of monney wth his daughter Mary in marriadge nor howe much he p*ro*missed yf he p*ro*missed any, nor knoweth vppon what p*ro*mise the Complt contracted him selfe wth the said Marye/. And more he Cannott depose.

5/To the ffyfte Interr this deponnt sayth that after the pl*aintiffes* marriadge wth the said Marye, he this depon*ent* went to see them, And the pl*aintiff* vppon some speeches betweene this depon*ent* and the pl*aintiff* the pl*aintiff* tould him that the de*fendant* had geuen him wth his daughter in marriadge the some of ten pound*es* and Certayne houshould stuffe, but the valewe of the houshould stuffe he knoweth not./ And more he Cannott depose./

Nouel Montioi

[27]

Witness Book, 44 Elizabeth to 16 James I, Miscellaneous Books, vol. 199.

[The Court's list of witnesses examined *ex parte* Mountjoy, Trinity Term, 1612.]

Xpofer Mountioy deft	Xpofer Weaver
	Nowell Mountioy
Stephen Bellott pl*aintiff*	Thomas fflower.

[28]

INTERROGATORIES.—THIRD SET.

[*Ex parte* Mountjoy, for 23 June, 1612. Written on parchment, and attached to the following depositions.]

Interrogatories to be ministred vnto witnesses p*ro*duced on the p*ar*te and behalf of Christopher Mountioy de*fendant* to the bill of Complaynt of Stephen Bellott Comp.^{lt}./

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1. Inprimis whether do yo^{u} knowe the parties plantiffes and defend^{t}./
2 Item whether did yo^{u} not heare or knowe that Mary the late wief of Christopher Mountioy the def^{t} did in her life tyme vrdge the said defend^{t} to give somthinge more vnto Bellott the plt./ and his wief then he had donn, and did not the said Mountioye the defend^{t} aunswere her that he would never promise them anie thinge: because he knewe not what he should neede himselfe? or what other speaches to that purpose did you heare her or anie other speake and when were they spoken declare the whole truth therein accordinge to yor remembrance
3 Item have you not heard the late wief of Christopher Mountioy the defend^{t} declare what her then husband the said Christopher Mountioy and shee had given the said Complt and his wief after theire Marriage and that shee would have had the said Christopher Mountioy her then husband to have given them more but he vtterly refused and would not or what other speaches have yo^{u} heard her say touchinge that matter declare the whole truth in particuler as yo^{u} remember?
4 Item do yo^{u} knowe or haue yo^{u} heard of anie monie or other goodes wch the said Comp.^{lt} Bellott hath receaved of the said Christopher Mountioy the defend^{t} or his late wief and whether were those sommes of monie or other goodes delivered to them and what was the vallewe of them declare yor whole knowledge herein?/
5 Itm hath not the Complaynant Stephen Bellott vrdged or perswaded yo^{u} to Conceale yor knowledge or otherwise to depose or speake somthinge Concerninge the matter nowe in question betweene him and the said Mountioy the defend^{t} wch yo^{u} knowe not to be truee and what speaches hath he lately vsed, or spoken vnto yo^{u} to that or anie such purpose and when did he speake them declare the premisses hereof according to yor knowledge?/
6 Item whether did yo^{u} heare or knowe that the said Christopher Mountioy the defend^{t} did by himselfe or anie from him desire the said Stephen Bellott the Comp^{lt} to reccon wth him about the monie and other things due betweene them and what aunswere did the said Bellott make therevnto and whether do yo^{u} knowe

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or haue heard that the said Bellott hath Confessed that he did owe the said Mountioy anie monie or other thinges and what was that monie and other thinges and when did he Confesse it and what speaches have yo^{u} heard the said Bellott speake Concerninge the Reconinge or difference betweene the said Mountioy and him and when did he speake them declare yor whole truthe herein?/

7 Item did not yo^{u} of yor voluntary will and disposition to make the pl^{t}. and defend^{t} frendes goe to the pl^{t}. about three weekes since and tould the pl.^{t} that he tooke a wronge Course to sue his Father in Lawe And that it weare better they weare kinde and Lovinge frendes and what aunswere made the plantiff vpon yor Conference wth him thereabout declare yor knowledge?/

[29–31]

DEPOSITIONS.—THIRD SET.

[*Ex parte* Mountjoy, 23 June, 1612. Written on paper 12¼ × 15¾, and attached to the preceding skin of interrogatories.]

Depositiones Captae ap.^{d} Westmonasterium xxiij^{tio} die Junij Anno Regni Jacobi Regis Angliae &c decimo et Scotiae xlv.^{to} ex parte Christopheri Mountioy defendentis vrs Stephanum Bellott quaerentem./

[29]

Christopher Weaver of the parishe of S^{ct} Olaves in Sylver Streete London mercer of the Age of thirtye Syxe yeres or th^{r}abouts sworne and examyned the daye and yere abouesaid deposith and saythe

1/To the ffirste Interr this deponent sayth he knoweth the plaintiff and defendant./

2/3/4/5/To the ij.^{d} iij.^{d} iiij.th v.th and vjth Interr this deponent is not examined at the Request of the deft

7/To the vijth Interr this deponent sayth that about three weekes synce he this deponent wishinge well to bothe the plaintiff and deft went of his owne voluntary will and disposition to talke wth

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the pl*aintiff* and to see yf he could bringe them to be frind*es* And Questioninge wth the pl*aintiff* About the same vnkindnes and shewinge him that he tooke A wronge Course to sue his ffath^{r} in Lawe, the pl*aintiff* Answeared him this depon*ent* that he would never haue sued his ffath^{r} in Lawe yf his ffath^{r} in Lawe would haue bene willinge to haue hadd his Companye in ffamilliar mann^{r} as at his table./ And said further he Could be contented the matter should be Ended betwixte them, so that his ffath^{r} would lett him dwell in one of his houses, wch was nexte to his owne dwellinge house payinge some Rent for yt, And furth^{r} said he could leave his wyffe in better estate then he ffound her whensoeuer god should be pleased to calle him, vnto wch this depon*ent* said he was gladd of yt, And said he this depon*ent* would make yt knowne to the deft his ffather. And do what he could to make them ffrind*es* or woord*es* to that effecte And soe did, but the def^{t} yt seemed had taken such an vnkinnes at his sonne in lawes vsage toward*es* him that he said he would never geue him Any more, As before he hath deposed in his Answeare to the plt*es* Interr. And more he Cannott depose.

Chr: Weauer

[30]

Nowell Mountioy of the p*ar*ishe of S^{ct}: Olaves in Sylver Streete London Tyremaker of the Age of thirtye yeres or th^{r}about*es* sworne and examyned the daye and yere abouesaid deposeth and saythe

1/To the ffirste Interr this depon*ent* sayth he knoweth the pl*aintiff* and de*fendant*./

2/3/ To the seconde and third Interr this depon*ent* Can saye nothinge touchinge any p*ar*te of the same Interr

4/To the iiijth Interr this depon*ent* sayth that the pl*aintiff* since his marriadge wth the deft*es* daughter Marye tould this depon*ent* that the deft had geuen them the pl*aintiff* and his wyffe the some of ten pound*es* in monney and Certayne houshould stuffe but the valewe of the houshould stuffe he cannott declare, for that he did not see the household stuffe deliu*er*ed./ And more he Cannott depose

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5 To the ffyfte Interr this depon*ent* sayth that the pl*aintiff* sent for him this depon*ent* about A yere since wch he thinketh is neere about or synce this suyte beganne. And asked this depon*ent* yf he knewe of the tenn pound*es* the deft his ffath^r^ in lawe gaue him and his wyffe synce there Marriadge./ And this depon*ent* tould the p*laintiff* he did knowe of yt, wherevppon the pl*aintiff* tould him this depon*ent* that yf when he was called to Answeare wherefore yt was geuen them, he this depon*ent* might doe him the pl*aintiff* good yf he this depon*ent* would Answeare that he the pl*aintiff* Receaved yt of the deff*endant* for woorke donne for him, sayinge to this depon*ent* that he the pl*aintiff* was lykelie to be A better ffrind to this depon*ent* then the deft would be, vrdginge that the deft was all for him selfe./ And furth^r^ that synce that tyme the plt*es* mayd lykewise vrdged this depon*ent* that shee herd him saye that he herd the deft saye that he gaue the pl*aintiff* that ten pound*es* aforesaid for woorke: wch was ffalse: ffor wch this depon*ent* Rebuked the mayde. And more he Cannott depose./

6/To the vj^th^ Interr this deponnt sayth that the plt tould him that the deft came vnto him And desired him to Reccon wth him About monney And other thing*es* betweene them/ And the pl*aintiff* tould this depon*ent* that he Answeared him the deft that he would not Reccon wth him any thinge, sayinge he was sorry he hadd not more in his hand*es* to Reccon wth him for then he hadd sayinge he saies I owe him three pound*es*, & he oweth me fforty shilling*es*, yf all come to all tis but twenty shilling*es* difference./ And more he cannott depose touchinge the said Interr to his Remember-aunce./

7/To the vij^th^ Interr this depon*ent* is not examyned at the Requeste of the de*fendant*

Nouel Montioi

[31]

Thomas fflower of the p*ar*ishe of S^et^ Albans in Woddstreete London m*er*chaunttaylo^r^ of the Age of thirtye Eight yeres or th^r^about*es* sworne and examed the daye and yere abouesaid deposith and saythe/

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1/To the ffirste Interr this deponent sayth he knoweth the plaintiff and deft

2/To the seconde Interr this deponent sayth that he hath often herd Marye the defendtes wyffe did often in her lyffe tyme vrdge her husbond the deft to geue somthynge more vnto the plaintiff and his wyffe then he had donne before wherevnto the deft Mountioye would comonlye answeare her that he would not promise them any thinge because he knewe not what he should neede him selfe./ And soe he hath herd the deft often saye he would promise nothinge for feare of wantinge him selfe or woordes to the lyke effecte./ And more he Cannott depose./

3/To the third Interr this deponent sayth he hath herd the deftes wyffe in her lyffe tyme saye that her husbonde and shee hadd geuen her daughter Marye and her husbond the plaintiff synce there marriadge togeathr the some of ten poundes in Monney And Certayne Implemtes of houshould stuffe, And that shee would haue had her husbond Mountioye haue geuen them more./ but he would not sayinge he knewe not what he him selfe might want or wordes to the lyke effecte. And more he Cannott depose/

4To the iiijth Interr this deponent sayth that he herd as aforesaid that the plaintiff Receaved of the deft ten poundes in monney and Certayne household stuffe./ but the valewe of the houshould stuffe he knoweth not./ And furthr sayth that synce the plaintiffes goinge from the deft the deft sent this deponent to the plaintiff to desire him to Reccon wth him for some Monney and other thinges wch he had takne wth him when he went Awaye./ And the plaintiff did answeare this deponent that he had but some fewe trifles of his wch he would not confesse in particuler nor deliuer. And more he Cannott depose/

5To the vth Interr this deponent sayth the plaintiff hath not at any tyme vrdged nor perswaded this deponent to conceale his knowledge nor otherwise to depose and speake Any thinge concerninge the mattr nowe in Question betweene them./ And more he cannot depose./

6/To the vjth Interr this deponent sayth that by him this deponent the defendt did longe synce desire the plaintiff to Reccon wth him

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the de*fendan*t about monney And other thing*es* due betweene them, wherevppon this deponnt moved him to A Recconinge, who Answeared in mann^r^ ffollowinge vz wheare I haue a penniwoorth of Any thinge, I would I hadd more of his I haue nothinge but that wch I will keepe And yf I owe him Any monney lett him com by yt as he Can./ wch Answeare this depon*en*t retorned the deft. And more he cannot depose.

7To the vij^th^ Interr this depon*en*t is not examned at requeste of the de*fendan*t./

Thomas fflowers

[32]

Decrees and Orders, Miscellaneous Books, vol. 26, p. 421.

[An order referring the matter at variance to the French Church in London for hearing,, ordering, and final determination, dated 30 June, 1612.]

Tricesimo die Junij A° p*raedicto*./

Bellot Mountioy

In the matter of varyance brought before the King*es* ma^tie^ and his highenes Counsaill in his ma^tes^ ho: Court of Whitehall by Stephen Bellot compla*inant* against Xpofer Mountioy def^t^, the said compla*inant* by his bill seeking to be releived touching A promise supposed by the said bill to be by him the said def^t^ Mountioy made for the payment vnto the said compla*inan*t^t^ of the som*m*e of threescore pound*es* or theareabout*es* vpon the day of the said compla*inan*t^tes^ mariage wth Mary Mountioy daughter of the said def^t^ & now wief of the compl^t^, And for the leaving to the said compla*inan*t^t^ & Mary his wief the some of CC^l^ more at the tyme of his the said def^tes^ decease, As in & by the said bill of complaynt more at lardge appeareth. Vnto wch bill the said def^t^ appeared & answered, witnesses on both p*artes* were exa*min*ed and A day of hearing appoynted. Vpon opening whereof Jt is by his ma^tes^ said Counsaill of this Court in p*rese*nce of the said p*ar*ties and of Counsaill learned on both sydes ordered by and wth the full consent of the saide p*ar*ties, that the same matter shalbe referred to the hearing ordering & finall determina-

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cion of the Reverend & grave overseers and Elders of the french Church in London aucthorising them hereby to call before them both the saide parties, And vpon consideracion had of the state of the same cause & the circumstances of the same, to heare Order & finally determine the said matter touching the promise as to their discrecions & wisdomes shall seeme convenient, And such order as shalbe herein determined by the said Committees this court will confirme establishe & decree./

[33-37]

Registers of the Consistory of the French Church of London, 1588–1615.

[Preserved in the Library of the French Protestant Church of London, Soho square, W. Written usually in plain Roman letters, except a part, as for example the notice of 2 Sept., 1613, in a flourished court-hand of Gothic-Roman, very difficult to read.]

Ce Liure Contient Les Actes du Consistoire de L eglise françoise De Londres Conmenchant le 2e. Jour de Januier. 1588—stil D'Angleterre a 1615–

[33]

Page 495.

[Séance] Du Jeudy 30e. Julyet 1612.

Cretophle Montioye ayant esté mis en proces par son gendre Etiene Belot, pour q^{l}q^{e} argent de son mariage q^{e} pretendoit luy deuoir vz: 10. li. dont n' auoit preuue, ne tesmoings. La Court par lettre nous pria de le mettre en Arbitre, ce qui fut fait, dont furent elleus, Abraham Hardret, Gedeon de Laune, pour Monioye: Et Dauid Carperau & Pierre Beauuais pour Belot. tous 2. pere & gendre desbauchéz.

[34]

In eodem, p. 498.

[Séance] Du Jeudy 13. 9-bre. *1612.*

Etienne Belot, redemandant le mereau, dont il s'est absteint de long

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temps a raison de atrouer ses auec son beau pere Cretophle Montioye. On veillera sur luy. & la Cene de 10–bre. &–c.

[35]

In eodem, p. 501.

[Séance] Du Jeudy 6.e· May. *1613.*

Cretophle Montioye, entré, fut censuré de ce q^l^ [=qu'il] ne payoit les 20. Nobles a son gendre, ordonné p*ar* les Arbitres, plaida poureté, bien q^e^ luy baillera des dettes, p*our* les receuoir. Et d'auoir eu 2. bastards. de sa seruante, a quoy il ne respondit p*er*tinam^t^ Aussi Michel Art son Ancien Leuicta de serm^t^ faux en la Court spirituelle q^l^ n' auoit couché avec elle. Ne se trouua preuue suffisante. Suspendu.

[36]

In eodem, p. 505.

[Séance] Du Jeudi 2 de 7 ber 1613

Cristopher Monjoie ha estes appelles 2 fois et ha dict qu'l ne setient point des notres p*ar*tant de aduiser en plus grande Compaingnie de sa rebellion

[37]

In eodem, p. 511.

[Séance] Du Dimanche 27.e· Febr. [1614].

Cretophle Montioye, ayant souuent esté exhorté, en p*ar*ticulier & Consistoire d'estre pieux, de sa vie desreglée, & desbordée, & suspendu sans fruict, estant endurci, ayant esté tiré au Magistrat p*our* ses paillardises, & adulteres; N'ayant voulu venir au Consistoire y estant appellé. Ne fréquantant ceste Eglize, suspendu publiquem^t^ p*our* ces scandalles. Exhortons de prier Dieu p*our* luy, de luy toucher le coeur, luy donant vraye rescipiscence.

[38-39]

Principal Probate Registry, Somerset House, Prerogative Court of Canterbury, Wills, 28 Fines.

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[38]

[Stephen Belott's Will, 20 July, 1646.]

In the name of God Amen I Stephen Belott of the Bowleing Alley neere Long Lane in the parish of Sepulchers without Newgate London Tyer maker: Being at this present Sick in body but of Sound and perfectt memorie, Lawd and praise be therfore giuen to Almightye God, Calling to minde my yeares and my infirmities, The ffrailtie of this Transitorie life and the vncertentye of the hower of death: doe make an Ordaine this my last will and Testament: And ffirst and Principallie I Commend my Soule into the handes of Almightie God my Creator, Hopeing and Stedfastlie beleeuing that by and through the Meritts of the death and passion and pretious blood shedd vppon the Crosse of Jesus Christ, his onely Sonne and my alone Sauiour and Redeemer, I haue and shall haue full and ffree Remission Pardon and fforgiuenes of all my Sinns and Offences; And to be saued vnto life euerlasting./ My body I Committ to the earth from whence it came to be decentlie buried, in assured Hope of the Resurrection thereof at the Gennerall Judgement day vnto life eternall: And touching such worldly goods and Estate as it hath pleased God of his greatt goodness and mercie to blesse me withall, I doe hereby giue deuise and bequeath the same in manner and forme following: That is to say, Inprimis whereas my late brother Master John Belott, late of the Citty of Harlem in Holland ffrench Schoolemaster deceased, in and by his last will and Testament beareing date the Third day of October, Anno Domini One Thousand six hundred ffortie and Twoe, hath giuen left and bequeathed vnto me the said Stephen Belott, the Summe of Nyne hundred Gilders, Being fowerscore and Tenn poundes English: To be paid after the decease of my sister in lawe Mistris Maijlie van Regemuorter late wife of my said brother Master John Belott deceased, As in and by his said Last will and Testament more at lardge doth and may appeare: And which said Legacie or summe of Nyne Hundred Gilders I haue Constituted authorized and appointed the Elders and deacons of the ffrench Reformed Church in Harlem, for the vse and behoofe

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of me my Executors and Administrators, to Aske Leauy sue for recouer and receaue the same, of and against the heires Executors and Administrators of my said sister in lawe Mistris Maijlie van Reemuorter after her decease As in and by the said writeing of deputation (Relation thereto being had) more at lardge doth and may appeare; And now my will and minde is, And I doe hereby will deuise and dispose the said Legacic of Nyne hundred Gilders being in English fowerscore and Tenn poundes in manner following: And first I giue and bequeath vnto my daughter Ann now the wife of William Haier wyer drawer, the somme of Twentie poundes thereof: Item I giue and bequeath vnto my daughter Jane now the wife of ffrancis Ouering, Glouer; the like Summe of Twentye poundes thereof: Item I giue and bequeath vnto my daughter Easter now the wife of Christopher Baytes, other Twentie poundes thereof: Item I giue and bequeath vnto my loueing wife Thomazine Belott Twentie poundes more thereof; And the other Tenn poundes my will is shalbe for the satisfieing of That Tenn poundes which I borrowed and receaued of my said sister in lawe Mistris Maijlie van Regemuater when I was with her in Harlem :Item I giue and bequeath vnto the poore of the Reformed Church in Harlem the summe of fforty shillings; And my will and desire is, That my loueing wife Thomazine Belott, and my daughter Jane Oueringe shall goe over togeather vnto Harlem in Holland; and there receaue and bring over the said moneys at such time and when as the same shall become due and payable after the decease of my said sister in lawe; And my will and minde is that my said loueing wife and my said three daughters shall be at, beare and allow euery one of them fower and equall parte portion and share towards the charges and expences of their Journey and trauelling ouer vnto Harlem, and for and about the recouering Changeing Transporting and returning and bringing ouer the said monies to deuide the said moneys to and amongst my said wife and my Three daughters equallie for the satisfieing of their said seuerall Legacies (euery one of them beareing and allowing an equall ffowerth parte of all expences and Chardges of fetching and bringing ouer the same as afore-

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said according to the true meaneing of this my last Will and Testament; The rest and residue of all and singuler my Goods, Chattells Houshould stuffe Apparrell Bedding Lynnen Wollen, Brasse Pewter Bonds Bills, writings Specialties debtes Ready monyes and all other my goods and estate whatsoeuer vnbequeathed (My debtes and legacies paid and my ffunerell expences dischardged) I doe fully and freely giue and bequeath vnto my said loueing wife Thomazine Belott whome I make and ordaine my full and sole Executrix of this my last Will and Testament; desireing her to execute and performe the same in and by all things according to my true intent and meaning herein before specified and declared: And I doe hereby Reuoke and disanull all former and other Wills by me at any time heretofore made; And I doe pronounce and declare this and none other to stand and be my last Will and Testament: In Witnes whereof I the said Stephen Belott to this my last Will and Testament (Contained in fower sheets of Paper) haue sett my hand and Seale, The fiue and Twentieth day of July Anno Domini One thousand six hundred ffortie six: And in the twoe and twentieth yeare of the Raigne of our Soueraig Lord King Charles &c

Par moy Etiene Belot.

Sealed and Subscribed by the Testator, and acknowledged Published and declared to stand and be his last Will and Testament in the presence of vs Roger Goude: Richard Gill Scr./

[39]

PROBATUM—fuit Testamentum suprascriptum Apud London coram Mag*ist*ro ffrancisco Ringsted Clerico Surrogato dilecti subditi no*str*i Nathanielis Brent Militis legum doctoris Curiae no*str*ae, Prerogatiuae Mag*risti* siue Custodis l*egi*time Constitutj, vicesimo quinto die Mensis ffebruarij Anno Domini iuxta Cursum et Computac*ione*m Anglicane [sic] Mill*es*imo Sexcentesimo quadragesimo sexto, Juramento Thomasinae Belott Relictae dicti defuncti et executricis in huius*mod*j Testamento nominatae Cui Comissa fuit Administrac*i*o omnium et singulorum bonorum iurium et creditorum eiusdem defuncti de bene et fidel*iter* Administrando eadem Ad Sancta dei Evangelia Jurata./ Ex^{r}

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II

THE WITTER–HEMINGES CASE.

The eight following records from the Court of Requests contribute to a knowledge of Shakespeare's financial relations to the Globe theatre as a shareholder. They supplement and are supplemented by the Osteler–Hemynges case.

The Witter–Heminges case arises out of the marriage of one John Witter (1606) with Anne Phillipps, widow of the actor and Globe share-holder, Augustine Phillipps, who died in 1605. Through Anne's executorship of her first husband's will, it is claimed, she came into possession of the Globe share formerly owned by Augustine Phillipps. Witter, through marriage with her, less than two years later, secured a legal interest in all her possessions, but claims now a separate right to the share in question through assignment of it to him by Anne in July, 1606. For fourteen years after this marriage, until the final decree of the Court of Requests dismissing this case absolutely and forever in 1620, Witter made trouble for the Globe company, only a part of which is related in the present set of documents. The story of his squandering his wife's estate, abandoning her and her children when her property was gone, the friendship of Heminges toward her, her death in poverty, and Hemynges's burial of her at his own charge is a little domestic tragedy not planned for public presentation on the boards of the Globe theatre, throwing out into sharp relief the character of Heminges as a representative member of the company.

The plan of organization and maintenance of the Globe company is here for the first time related, as is also the plan, after the fire of 1613, of rebuilding the Globe, attended by doubts, delay, and heavy expense. Some of the changes in share-ownerships are mentioned, as the purchase of William Kempe's share in 1599 by Shakespeare, Heminges, and Phillipps in equal thirds, the transfer of it at once to an outside party who in turn immediately regranted it to Shakespeare, Heminges, Phillipps, and

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Pope in equal fourths, the sale of a share to Osteler, the granting of a half share by Heminges to Condell gratis, the sale of a share to Nathaniel Field after Shakespeare's death, and the whole complicated history of the share claimed by Witter, with its varying shifts of ownership.

One of the significant items in the Witter-Heminges case concerns the basis of organization of that half of the Globe company in the membership of which Shakespeare is always named first. He and his associates converted their half from a tenancy in common into a joint-tenancy. The nature and significance of this sort of organization and its apparent influence on all succeeding theatrical organizations of the time, accompanied by a summary of the chief data and a story of considerable human interest in its bearing upon Shakespeare and his fellows, is presented in an article in the *Century Magazine,* August, 1910. This central point of joint-tenancy illuminates the bare facts in the history of the shares as told by these and the Osteler-Hemynges records, and explains conditions of organization and management in all the other theatrical companies. The relations of Shakespeare and his associates to each other in building, managing, and rebuilding the Globe theatre, and in maintaining their enterprise throughout with a larger spirit of equity than the strict letter of joint-tenancy would allow, rising above the smoke and fume and smouldering fire of Witter's making, emerge now from the centuries with noble proportions.

Shakespeare's income from his share in the Globe theatre was equal to that of each associate who owned the same amount. Witter in these documents declares that his own income from one share previous to the fire and while he owned one-seventh of one-half (or one-fourteenth of the entire theatre, the same as Shakespeare then owned) was 30 *l.* to 40 *l.* a year. Although Witter is an unconscionable distorter of facts when thereby advantage is to be gained, he has no occasion in this instance either to magnify by false statement or to minify the amount of profit received. Moreover, this annual profit from one share in the Globe agrees with a similar amount of 30 *l.* from a share

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of one-seventh in the Red Bull, as presented in the new documents published in the *Studies,* October, 1909, and with another similar amount of about 33 *l.* to 53 *l.* on one-sixth of the Blackfriars just before Shakespeare's company in 1608 took the lease of that theatre. Other evidence also is available, rendering it now possible to make a first tentative study of Shakespeare's income on the basis of historical facts. The large fancy hitherto exhibited, through which it has been romantically guessed out that Shakespeare's income from his share in the Globe was 500 *l.* to 600 *l.* a year was a pretty fancy, which must now for all time be yielded up, even with pangs of regret to those who have built Shakespearean reputations on a collection of similar romantic inferences that pass current for fact in popular biographies of the Poet.

It is not my present purpose to analyze nor even to suggest lines of analysis of these documents. They will tell various stories to various interpreters according to the information, bent, and analytic power brought to the study of them.

[1–10]

WITTER *vs.* HEMINGES AND CONDELL.

Court of Requests Proceedings, James I, Uncalendared. Case of John Witter vs. John Heminges and Henry Condell. (Recently withdrawn from circulation and now preserved separately.)

[Three large skins, consisting of Bill, 21 × 17; Answer, 26 × 26; and Replication, 26 × 26. Fairly well preserved. Ink generally clear, but in some places partly or wholly gone, leaving its impress in the parchment which can still be read with good light and a strong magnifying glass.]

[1]

BILL.

[*In dorso*] xx° die Aprilis Anno *Regni* Regis Jacobi Angliae ffranciae et Hiberniae xvij° et Scotiae lij^do^./

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Vocentur defend*entes* p*er* nuntiu*m* Camer*ae*./
Ar. Parkins

To the king*es* most excellent Maiestie

Most humbly complayninge sheweth vnto yor most excellent Maiestie yor most humb*le* Subiecte John Witter of Mortlake in the Countie of Surrey gentleman That Whearas Augustine Phillippes of London gentleman deceased was in his lyeffe tyme lawfully possessed for many yeares then in beinge and yet to contynewe of and in a sixte parte of the moytie of the gallories of the playehowse called the Globe in Southwarke in the Countie of Surrey (sithence the death of the said Augustine Phillipps consumed with fier and lately reedified) And of divers gardeins thervnto belonginge and adioyninge by force of a demise or lease to him the said Augustine Phillipps made of all the same by Nicholas Brenn of Mouldsey in the said Countie gentleman who was therof seized in his demeasne as of ffee, And he the same Augustine Phillipps soe beinge thereof possessed in or aboute the moneth of Maie in the third yeare of the raigne of yor Maiestie made his last will and testament in writinge, And thereby did constitute and make his then wyeffe Anne his Executrix of his said last will and testament, and shortly after dyed soe possessed of the said tearme, And sone after the decease of the said Augustine Phillipps his said will or testamente was duely proved before Sr John Bennett Knight then Iudge of the Prerogatyve Courte of the then Archbyshoppe of Canterburie wch was the Competente Ordinarie to whome the same did then app*er*taine and belonge of right accordinge to your Maiesties Ecclesiasticall lawes of yor highnes Realme of England. By virtue whereof and of a devise or guifte in and by the same will and testamente to her gyven and devised, shee the said Anne Phillipps the executrix and relicte of the said Augustine Phillipps into the said sixte parte of the said gallories ground and play howse of the Globe and gardens entered and was thereof possessed accordinglie and did receaue and take the yssues profittes and com*m*odities therof as well and lawfull was for her to doe And shee soe beinge thereof, and of the other goodes and Chattells of her said late deceased husband wch shee

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administred possessed did duringe the tyme of her wyddowehoode that is to saye in or aboute the moneth of Julie in the said third yeare of yor Ma:^tes said raigne of this yor Realme of England sufficientlie graunte and assigne over vnto yor said Subiecte all the same tearme therein then to come and vnexpired togeather wth the orriginall lease or graunte thereof vnto her said late deceased husband soe made and graunted by the said Nicholas Brenn as ys aforesaid. To haue and to hould the same vnto yor said Subiecte and his assignes for and duringe all the tearme and tyme therein then to come and vnexpired. By force whereof yor said Subiecte thereinto did enter and was thereof possessed accordingly and receaved the rentes yssues and profyttes thereof accordinglie for fyve yeares vntill nowe of late aboute eleaven yeares last past That yor said Subiecte wantinge money was dryven to morgage the same lease and tearme vnto Iohn Hem*m*ynges of London gent for the some of ffiftie pownd*es* wch yor said Subiecte then of him had and receaved vpon a provisoe or Condic*i*on therein expressed for the repaymente thereof with ffiftie shillinges more for the vse or interest thereof at the end of six monethes then next enseweinge All wch ffiftie twoe pownd*es* and tenn shillinges the said Hem*m*ynges then had and accepted of at the hand*es* of yor said Subiecte at the said lymitted tyme accordinge to the said provisoe or Condic*i*on before menc*i*oned at such tyme as yor subiect was in prison in the Kinges Bench in Southwarke aforesaid. But nowe soe yt is may yt please yor Maiestie That the said orriginall lease last will and testamente and the assignemente and graunte aforesaid beinge by such meanes as ys aforesaid or by some other casuall meanes come to the handes and possession of the said John He*m*mynges and one Henry Coundall gentleman one of his fellowes and familiar Companions beinge both s*er*vantes to yor Maiestie they the said John Hem*m*ynges and Henry Coundall by cullour of haueinge thereof not onelie haue wroungfullie and without any iust tytle aboute fyve yeares last past entered into and vpon the said sixte parte of the said playe howse grounde gallories and gardeins called the Globe, but alsoe did by like wrounge and inivrie ever sithence and yet doe detayne and keepe

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the same And all the rentes yssues and profyttes thereof from yor said Subiecte without any recompence or consideracion to him therefore gyven payed or allowed and haue made and contrived vnto them selves and to dyvers other persons vnto yor said Subiecte vnknowne dyvers and sundrie subtile seacrett and fraudulent estates of purpose to defraude and defeate yor Subiecte thereof. And that he might not knowe whome to sue for the same nor against whome he might recover the premises, All wch is done contrarie to all right equitie and good conscience, And to the vndoeinge of yor said Subiecte his wyeffe and Children vnlesse yor Maiesties accustomed ayde to him be therein as yt is to others in like distressed cases extended. In tender consideracion whereof And for asmuch as the said John Hemmynges and Henry Coundall haue hithervnto denyed and refused and as yet doe denye and refuse to permitt yor said Subiecte quietlie to enioye and possesse the demised premises or yet to redelyver vnto yor said Subiecte the said orriginall lease last will and testamente and the assignemente and graunte before mencioned made by the said Anne, And satisfie your said Subiecte for the meane profittes thereof although they the same John Hemmynges and Henry Coundell and either of them haue byne therevnto often in frendlie and curteous manner required and desired to doe all the same wch they affirme and pretend by theire wordes speeches and Actions they will still soe contynewe theire doeinge of and hould perforce your said Subiecte from and out of the same without any accompte profytte or commoditie thereof to your said Subiecte to be gyven or answered for the same, And for asmuch as the said morgage soe made to the said John Hemmynges and the paymente of the said ffiftie twoe powndes and tenn shillinges vnto him the same John Hemynges by your said Subiecte was in private and seacretlie had and made And scarse any more then them selves that be nowe alyve privie or acquainted therewith, Whoe san testifie the same. And for that also yor said Subiecte doeth not knowe all the certainety of the said last will or testamente orriginall lease and the assignemente thereof, nor the full substance and sure contentes or certaine and true dates thereof nor whether

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the same or any of them be contayned in any Chest Cubbord or truncke locked, or any bagge or boxe sealed or otherwise, And for that alsoe yor said Subiecte verilie hopeth and is *per*swaded that the said John Hem*m*ynges and Henry Coundall beinge to answeare hearvnto in this Courte vpon theire oathes will (As your Subiecte desireth) thereby confesse and acknoweledge all the whole truth for and in the premisses vpon theire oathes in theire answeares hearvnto whervnto they are not compellable at or by the Com*m*on lawes of this Realme, And for asmuch alsoe as yor said Subiecte ys not of abilitie and power to contend in lawe with the said John Hem*m*ynges and Henry Coundall who are of greate lyveinge wealth and power and haue many more mightie and greate frendes then yor said Subiecte whereby he ys and shalbe destitute of all helpe remedy and hope to be ayded and releeved by the ordinary and strickte course or rigor of the Com*m*on lawes and ordinary proceedinges of this Realme or ellswheare then by your Maiestie or your Courte of Requestes and Counsell of Whitehall at Westminster vsuall[y] extended to helpe and succour them in theis and the like Cases distressed or oppressed. May it please your highnes to graunte vnto your said Subiecte your most gracious wrytt of privie Seale to be directed to the said John Hem*m*ynges and Henry Coundall and to either of them Com*m*aundinge them and either of them at a certaine day and vnder a certaine payne theirein to be lym*m*itted to be and *per*sonollie to appeare before yor Maistie and Counsell in the said honorable Courte of Requestes at Whitehall in Westminster then and theire to answeare vnto the premisses, And further to stand to and abyde such further order and direction therein As to your highnes said Counsell of the same Courte shalbe therein taken and thought fytt to agree with equitie and good conscience. And your said Subiecte shall accordinge to his duety daylie pray vnto god for the longe pres*e*rvac*i*on contynewance and stabilitie of your Maisties most happie raigne.

Raphe Wilbraham

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[2]

Appearance Book, 16 and 17 James I.

[This book was found by me among the uncalendared Proceedings of the Court of Requests, and handed over to the proper official who has placed it among the "Miscellaneous Books" of this court.]

Liber Emptae p*er* Petru*m* Langley in
Termino pasche xvj^to^ Jacobj Regis &c

23 April, 17 James I.

Joh*ann*es Heminges et Henricus Cundall gen*erosi* p*er*sonali*ter* comp*aruerun*t cor*am* con*silio* p*er* mandat*um* nost*r*um Camer*ae* ad sectam Joh*ann*is Witter gen*erosi*. postea viz 28° die mensis instan*tis* admissi sunt p*er* Lee: con*silio* mag*ist*ri Kele

[3]

ANSWER.

xxviij°: die Aprilis Anno R*egni* R*egis* Jacobi
Angli*ae* ffranci*ae* et Hiber*niae* xvij°. et Scotiae. lij^do^./

The ioynt and seuerall answers of John Hemings and Henry Condell gentlemen def^tes^ to the bill of Complaint of John Witter gentleman Complaynant.

The said Def^tes^ and either of them saueing to themselues and either of them nowe and at all times hereafter all advantages of excepc*i*on to the incertentie & insufficiencie of the said bill of comp*lain*t for answer to so many of the matt^rs^ therein conteyned as any way concerne them the said def^tes^ or is materiall for them or eith^r^ of them to answer vnto Do say & eith^r^ of them for himself saith That he thincketh it to be true that the said Augustine Phillipps in the said bill of Comp*lain*t named was in his life time lawfully possessed of such terme of yeeres of & in a fiveth p*ar*te of the moitie of the said galleryes of the said Playhowse Called the globe in the said bill menc*i*oned and of divers gardens therevnto belonging & adioyning And that the said Nicholas Brend in the

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said bill named was thereof seised in his demesne as of fee as in the said bill is alledged But the said def^tes^ say that they do not thincke that the said Augustine Phillips was so possessed of the said terme of yeeres by force of a demise or lease to him the said Augustine Phillipps made of all the same by the said Nicholas Brend ymediatly/ ffor the said gardens and grounde*s* wherevpon the said Playhowse & galleryes were afterwarde*s* builded were demised & letten by the said Nicholas Brend by his Jnde*ntur*e of lease trip*ar*tite bearing date in or about the xxj^th^ day of ffebruary in the xlj^th^ yeere of the raigne of the late Queene Elizabeth vnto Cuthbert Burbadge Richard Burbadge Willi*a*m Shakespeare the said Augustine Phillipps Thomas Pope the said John Heminge*s* one of the said def^tes^ and Willi*a*m Kempe To have and to hould the one moitie of the said garden plotte*s* and ground to the said Cuthb*er*t Burbadge and Richard Burbadge their executo^rs^ admi*n*istrato^rs^ & assi*gne*s from the ffeast or the birth of our Lord god Last past before the date of the said Jnde*ntur*e vnto thend & terme of xxxj yeeres from thence next ensuing for the yeerely rent of seaven pounde*s* & five shillinge*s* And to haue & to hould thoth^r^ moitie of the said garden plotte*s* & grounde*s* vnto the said Willi*a*m Shakespeare Augustine Phillipps Thomas Pope the said John Heminge*s* one of the said def^tes^ & Willi*a*m Kempe their executo^rs^ admi*n*istr*ator*s & assi*gne*s from the said ffeast of the Birth of our Lord god then last past before the date of the said Jnde*ntur*e vnto the said full end & terme of xxxj yeeres from thence next ensuing for the like yeerely rent of seaven pounde*s* & five shillinge*s*. Which said Wm Shakespeare Augustine Phillipps Thomas Pope John Heminge*s* & Willi*a*m Kempe did shortlie after graunte & assigne all the said Moitie of & in the said gardens & grounde*s* vnto Willi*a*m Levison and Thomas Savage who regraunted & reassigned to eue*r*ye of them seue*r*ally a fift p*ar*te of the said Moitie of the said gardens & grounde*s*, Vpon wch p*r*emisses or some p*ar*te thereof there was shortly after built the said then Playhowse. So as the said Augustine Phillipps had a fiveth parte of the moitie of the said gardens & grounde*s* & after the said Playhowse was built he had a fiveth p*ar*te of the said galleryes

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of the said Playhowse in ioynt tenancie wth the said William Shakespeare Thomas Pope the said John Heminges & Wm Kempe & as tenant in Common during the said terme of yeeres demised by the said Nicholas Brend as aforesaid as the said def^tes^ do take it But the said def^tes^ do say that about the time of the building of the said Playhowse & galleryes or shortlie after a third parte of the fiveth parte of the said Moitie of the said Playhowse galleryes gardens & ground wch was the fiveth parte of the said William Kempe did come vnto the said Augustine Phillipps by a graunt or assignem^t^ of the said fiveth parte made by the said Wm Kempe to the said Wm Shakespeare the said John Heminges one of the said def^tes^ and the said Augustine Phillipps./ W^ch^ said Last mencioned fiveth parte did shortlie after come to Thomas Cressey by the graunte & assignem^t^ of the said Wm Shakespeare the said John Heminges and Augustine Phillipps wch said Cressey did shortlie after regraunte and reassigne the said fiveth parte to the said William Shakespeare John Heminges Augustine Phillipps & Thomas Pope as the said def^tes^ do take it. So as the said Augustine Phillipps then had a fiveth parte and the fourth parte of another fiveth parte of the said moitie of the said playhowse galleryes gardens and groundes as the said def^tes^ do verily beleeve for & during the same terme of yeeres/ And the said def^t^ John Heminges doth also say that he thincketh it to be true that the said Augustine Phillipps being so of one fiveth parte and of the fourth parte of another fiveth parte of the said moitie so possessed in or about the time in the said bill mencioned made his Last will & testam^t^ in writing & thereby made his then wife Anne his executrix of his said Last will & testam^t^ & shortlie after died so possessed of the said terme of & in the said parte of the said moitie as is aforesaid And that shortly after his decease his said will was proved in the Prerogative Court of Canterbury as in the said bill is alledged. And the said def^t^ John Heminges doth say that he likewise thincketh it to be true that by vertue of her the said Annes being Executrix of the said will shee into the said partes of the moitie of the said galleryes ground & playhowse late of the said Augustine Phillipps as aforesaid did enter & was

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thereof possessed accordingly and did receive & take the yssues proffitt*es* and com*m*odities thereof But whether her said entrie into the said p*ar*te or into any p*ar*te thereof was by virtue of a divise or guift in & by the said will & testam^{t} to her geven & devised or not this def^{t} saith he knoweth not And yet he thincketh it to be true that the said testato^{r} Augustine Phillipps in & by his said Last will & testament did geve & bequeath one third p*ar*te of all his good*es* & chattells to the said Anne But this def^{t} saith that he doth not thinck that the said Anne made her elecc*i*on to haue a third p*ar*te of the p*ar*tes Late of the said Augustine her said husband of the said moitie of the said galleryes gardens & ground as a legacie geven vnto her by the said will And this def^{t} John Hemings doth also say that although the said testato^{r} Augustine Phillipps in & by his said Last will and testam^{t} did ordeyne & make the said Anne his wife Executrix of his said Last will & testament yet the same was not absolutely but onley with proviso or vpon condic*i*on in the said will expressed that if the said Anne his wife should at any time marrie after his decease That then & from thenceforth shee should cease to be any more or longer Executrix of his said Last will or any wayes intermedle with the same And that then and from thenceforth this def^{t} John Hemings the said Richard Burbadge Will*i*am Slye & Tymothie Whitehorn should be fully & wholie his executo^{rs} of his said Last will and testament as though the same Anne had never byn named As by the same last will and testament ready to be shewed to this honorable courte (to which said will this said def^{t} for the more certentie thereof doth referre himself) more playnely appeareth. And this def^{t} John Hemings further saith that the said Compl*ai*n*an*t in or about the Moneth of November in the fourth Yeere of the Kings Ma^{tes} raigne of England Did come to this def^{t}, and making shewe and affirming that the said Anne and himself then stood in greate nede of money did make offer to p*ro*cure the said Anne to mortgage her said terme of and in the said fiveth p*ar*te of the said Playhowse galleryes gardens and grounds wch was so regraunted to the said Augustine Phillipps by the said Levison and Savage as is aforesaid vnto this

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def^{t} for the somme of fiftie pounde*s* or thereaboute*s* wherewith to relieve their wante*s* and would haue had the said Anne by herself to have made the said Mortgage to this def^{t}. But this def^{t} then suspecting that the said Compl*ainan*t and Anne having then by a good space byne in treatie of a mariage betwene them might then be secretlie marryed and so her assuraunce alone nothing worth and nothing at all then doubting that the said Anne had assigned over the said terme of yeeres of & in the said fiveth p*ar*te of the said moitie to the said Compl*ainan*t this def^{t} required the said Compl*ainan*t to ioyne in the said assuraunce of the said terme of yeeres of the said fiveth p*ar*te of the said moitie in Mortgage for his said money wch he the said compl*ainan*t yeelded vnto And therevpon both the said compl*ainan*t & the said Anne then confessing themselues to be maried ioyned in the said Mortgage to this def^{t} and he paid vnto them the said some of 50^{li} wch together with 50^{s} for consideraci*on* for the forbearaunce thereof this def^{t} Confesseth was repaid vnto him on the day lym*m*itted in & by the said dede of assuraunce in mortgage for the repayment thereof. But this defend^{t} did not knowe or thincke that the said Anne had assigned or settover the said terme of yeeres & the said interest of & in the said fiveth p*ar*te of the said moitie vnto the said compl*ainan*t wch if shee had don*n*e this def^{t} thincketh he had byne meerely deceived & defrauded of his said 50^{li} if he would haue lent the same wthout the said Compl*ainante*s ioyning wth the said Anne in the said Mortgage But if any such assignement of the said terme of yeeres was made by the said Anne vnto the said Compl*ainan*t before the said compl*ainan*t & the said Anne intermaried the same was done contrary to the said testato^{rs} meaning in & by his said Last will and to the trust by him reposed in the said Anne thereby & wth purpose to take away & avoid theffect of the said condici*on* made by the said testato^{r} in his said will wch was intended for the good & p*re*ferment of his children Which Course of dealing this def^{t} thincketh deserveth no favo^{r} or relief in any Court of equitie And this def^{t} hopeth to prove that the said Anne did not make the said supposed assignem^{t} of the said terme of yeeres & interest of & in the said fiveth p*ar*te of the said

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moitie to the said Compl*ainan*t before their intermariage for that after their said intermariage the said compl*ainan*t claymed the same p*ar*te onely in the right of the said Anne his wife as Executrix of the said Augustine Phillipps as will appeare by divers writing*es* & otherwise And this def^{t} verely thincketh that if the said supposed assignem^{t} be p*ro*duced & brought to light that it will not abide the touch in the triall thereof Or if the said Anne did make the said assignem^{t} vnto the said Compl*ainan*t before their intermariage this def^{t} hopeth to prove that it was and is meerely void in Lawe And this def^{t} saith that after the said intermariage of the said Compl*ainan*t wth the said Anne he the said compl*ainan*t did ioyne in the graunting of two sixth p*ar*tes of the said Moitie of & in the said Playhowse galleryes gardens and ground*es* wth this def^{t} & the rest then interessed therein vnto Willi*a*m Slye and the said other def^{t} Henry Condell/ And this def^{t} doth deny that he or to his knowledge the said other def^{t} Henry Condell hath the said assignement or graunt so supposed to be made by the said Anne to the said Compl*ainan*t. But Confesseth that he hath the said last will and testam^{t} of the said Augustine Phillipps and the said dede whereby the said Augustine Phillipps had onely a fiveth p*ar*te of the said Moitie of the said Playhowse galleryes gardens & ground during the said terme of yeeres and that at & vpon the earnest solicitac*i*on & intreatie of the said Anne before the said repaym^{t} of the said fiftie pound*es* vnto this def^{t} shee then in vrgent manner affirming vnto him that the deliu*er*ye thereof vnto the said Compl*ainan*t would be her vtter vndoing he this def^{t} did forbeare to deliver the same vnto the said Compl*ainan*t but kept the same And this def^{t} hath also in his hand*es* and Custody the said originall lease so made by the said Nicholas Brend to him & oth^{rs} as is aforesaid and keepeth the same to the vse of himself & the rest wch haue any interest therevnto by & wth their Consent*es* And this def^{t} further saith that by meanes that the said Compl*ainan*t & the said Anne were intermaryed whereby the said Condic*i*on in the said will of the said Augustine Phillipps was broken and especially to keepe the Compl*ainan*t from receaving or recovering of the some of 300^{li} w^{ch}

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did then remaine in the hand*es* of Sir Eusebius Jsam Knight least he should spend the same as he had before lavishly and riotuously spent wasted & consumed almost all the rest of the said good*es* & chattells wch were of the said Augustine Phillipps and as he after spent 80^{li} of the said 300^{li} wch he gott out of this def^{tes} hand*es* after that he had received the same 300^{li} of the said Sr Eusebius and wth the consent and intreatie of the said Anne the admi*ni*stra*ci*on of the good*es* and chattells of the said Augustine Phillipps in or about the Moneth of May in the fiveth yeere of his Ma^{tes} said raigne was Com*m*itted to this def^{t} in the p*re*rogative Court of Canterbury as Executo^{r} of the said Last will & testament of the said Augustine Phillipps By virtue whereof he this def^{t} did enter into the said fiveth p*ar*te of the said moitie of the said Playhowse galleryes gardens and ground*es* and did take the rent*es* yssues and proffitt*es* thereof as well & lawfull it was as he hopeth for him to doe After which said admi*ni*strac*i*on so taken by this def^{t} he paid a legacie of five pound*es* to or for the poore of Mortlack in the County of Surrey wch the said Anne & the said Compl*ai*nan*t* had left vnpaid by all the time wherein shee was executrix as aforesaid and he this def^{t} is to pay more legacyes to oth^{rs} when the same shalbe due & payable by the same last will and this def^{t} in Charitie also to relieue the said Compl*ai*nan*t* & the said Anne his wife & her children did from time to time divers & many times deliver sometimes vnto the said Compl*ai*nan*t* & sometimes to the said Anne divers som*m*es of money amounting in the whole to a greate some vntill about the Moneth of ffebruary in the Eight yeere of his Ma^{tes} said raigne about wch time the said compl*ai*nan*t* & Anne his wife by their dede pole bearing date the tenth day of ffebruary in the said Eight yeere of his Ma^{tes} said raigne (this def^{t} then being in possession of the said fiveth p*ar*te of the said moitie of the said playhowse galleryes ground*es* & gardens) did remise & release vnto this def^{t} all & al manner of acc*i*ons debt*es* bills bond*es* accompt*es* matt^{rs} & demaund*es* whatsoeu*er* as by the said dede pole ready to be shewed to this ho^{ble} Courte may appeare By wch said release this def^{t} hopeth that the said Compl*ai*nan*t* is barred both in lawe & equitie

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to sue for or demaund the said fiveth p*ar*te of the said moitie of the said playhowse galleryes ground or gardens & Contrary or against wch said Compl*ainantes* owne dede of release this def^t^ hopeth that this ho^ble^ Courte will not p*er*mitt the said Compl*ainant* to sue this def^t^ for the said fiveth p*ar*te or any p*ar*te of the said moitie of the said playhowse in this hob^le^ Courte And this def^t^ furth^r^ saith that shortlie after the makeing of the said release by the said Compl*ainant* & his wife to this def^t^ the said Compl*ainant* & his said wife did take a lease of this def^t^ by Jnd*entur*e bearing date the xiiij^th^ day of the said Moneth of february wch was but foure dayes after the date of the said release, of a sixth p*ar*te of the said moitie of the said playhowse garden plott*es* and p*rem*isses for the terme of Eighteene yeeres from the birth of our Lord god then last past yelding & paying therefore yeerely during the said terme vnto this def^t^ his exec*utors* adm*inistrators* & ass*ignes* xxiiij^s^ij^d^ of Lawfull money of England at the ffeast*es* of thanunciac*i*on of the blessed virgin Mary the Nativity of St John Baptist St Michael Tharchangell & the birth of our Lord god or w^th^in tenne dayes after eu*er*ye of the same ffeast dayes by even porc*i*ons Provided alwayes that if it should happen the said yeerely rent of xxiiij^s^ij^d^ to be behinde vnpaid in p*ar*te or in all by the said space of tenne dayes next over or after any of the ffeast dayes of paym^t^ thereof aforesaid in wch the same ought to be paid being lawfully demaunded Or if the said Compl*ainant* his exec*utors* ad*ministrator*s or ass*ignes* should not w^th^in one yeere then next Comeing pay and discharge the said legacie of five pound*es* geven & bequeathed by the last will & testam^t^ aforesaid vnto the poore of the p*ar*ish of Mortlack or should not w^th^in the space of one whole yeere then next Comeing Cause & p*ro*cure a sufficient acquittaunce or dischardge vnder the hand*es* & seales of the p*ar*son or Curat and Churchwardens of the said p*ar*ish to be geven & deliu*er*ed to this def^t^ his exec*utors* ad*ministrator*s or ass*ignes* for his & their dischardge of & for the said legacie of five pound*es* wth divers oth^r^ p*ar*tes of the said Condic*i*on hereafter to be p*er*formed by the said Compl*ainant* his exec*utors* adm*inistrators* & ass*ignes* That then the demise & graunte aforesaid of the *prem*isses should

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be void & of none effect. Jn wch said Jnd*entur*e of lease it is recited and expressed that the said sixth p*ar*te of the said Moitie of the said Playhowse garden plott*es* & p*re*miss*es* was then Lawfully Come to the hand*es* & possession of this def^t^ by his being adm*ini*strato^r^ of the good*es* chattells right*es* & debt*es* aforesaid of the said Augustine Phillipps, And that this def^t^ in consideraci*on* that the said Compl*ainan*t should pay & dischardge the said Legacie of five pound*es* and two oth^r^ legacies of tenne pound*es* a peece menci*on*ed in the said Condici*on* did make the said demise & lease As by the Counterp*ar*te of the said Jnd*entur*e of lease ready to be shewed to this ho^ble^ Courte (whereto this def^t^ refer-reth himself) more playnely appeareth/. whereby this def^t^ thincketh that it manifestly appeareth that the said Compl*ainan*t then claymed not the said sixth p*ar*te of the said Moitie by the said supposed assignem^t^ by him p*re*tended to be thereof made vnto him by the said Anne & that this def^t^ was Lawfully interessed in the said sixth p*ar*te as adm*ini*strato^r^ when the said release was so made vnto him or by the said release when the said def^t^ made the said Lease vnto the said Compl*ainan*t & his said wife of the said sixth p*ar*te of the said moitie of the said playhowse gardens & ground And this def^t^ furth^r^ saith that about the said terme of five yeeres Last past menci*on*ed in the said bill of Compl*ain*t or about Six Monethes before the said Playhowse and galleryes were casually burnt downe & consumed wth fier/. Shortlie after wch this def^t^ and his p*ar*tners in the said Playhowse resolued to reedifie the same & the rath^r^ because they were by Covenante on their p*ar*te in the said originall lease conteyned to mainteyne & repaire all such building*es* as should be built or erected vpon the said gardens or ground during the said terme as by the said originall lease may appeare And therevpon this def^t^ did write his L*ett*re to the said Compl*ainan*t signifieing the same vnto him & therein required him to come & bring or send 50^li^ or 60^li^ by a day therein menci*on*ed for & towards the reedifieing of a howse in regard of his the said Compl*ainantes* p*ar*te of the said ground wch this def^t^ had so demised vnto him & his said wife by the said lease if he would adventure so much (he the said Compl*ainan*t

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having latly before ioyned with the said def^tes & the rest then interessed in the said moitie of the said playhowse gardens & ground to William Ostler of a seaventh parte of the said moitie) But the said Complainant neither brought or sent any money towardes the reedifieing of the said Playhowse Nor did this def^t ever receive any answer by or from him the said Complainant of his this def^tes said Lettre which when this def^t perceived although the said Complainant had broken the said Condicion of the said lease by not paying the said legacie of five poundes & by not procuring of the said acquittaunce or dischardge from the said parson or Curatt & Churchwardens of Mortlack aforesaid yet he this def^t demaunded the two next quart^rs rentes reserved vpon the said lease on the severall tenth dayes after the said two next ffeastes of paym^t & there Continuing his said demaundes vntill the sunne was sett on eith^r of the said dayes But neith^r the said Complainant nor any for him paid or came to pay eith^r of the said quart^rs rentes on eith^r of the said dayes And therevpon this def^t did enter into the said parte so demised as aforesaid for the said Condicion broken & because he found that the reedifieing of the said playhowse would be a verie greate charge & doubted what benefitt would arise thereby & for that the said originall Lease had then but a fewe yeeres to come he this def^t did geve away his said terme of yeeres & interest of & in the one Moitie of the said parte of the said Moitie of the said garden plottes & ground to the said oth^r def^t Henry Condell gratis The reedifieing of wch parte hath sithence Cost the said def^tes about the somme of Cxx^li, and yet one other sixth parte of the said moitie of the said playhowse galleryes gardens & ground before the said playhowse was burned & Consumed with fier was absolutely sould for lesse money then the half of the said charges of the said def^tes in the newe building thereof when there were more yeeres to come therein then there were at the time of the said burning thereof & yet the said Complainant was in Lawe chardgeable wth the reedifieing of the said parte of the said moitie by the said lease, And this def^t further saith that sithence the said release & lease made as is aforesaid he hath also from time to time divers & manie times in

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Charitie & to relieve the said Compl*ainan*t his said wife & her children deliu*er*ed sometimes vnto the said Compl*ainan*t himself, sometimes to his said wife & sometimes to oth^{rs} for them divers oth^{r} som*m*es of money amounting to a further greate some of money vntill about the said time of the burning of the said playhowse & the said Compl*ainan*t divers yeeres before the said Anne dyed did suffer her to make shift for herself to live & at her death this def^{t} out of charitie was at the charges of the buryeing of her./ Without that that the said Nicholas Brend made a demise or lease of the said sixth p*ar*te of the said moitie to the said Augustine Phillipps or of any p*ar*te oth^{r}wise then as is aforesaid or that the said Anne to this def^{tes} knowledge did or could graunte or assigne the said supposed originall lease to the said Compl*ainan*t or that the said Augustine Phillipps died possessed of a sixth p*ar*te onely of the said playhowse gardens & ground*es* as in the said bill of Compl*ain*t is p*re*tended/ And the said other def^{t} Henry Condell for himself saith that the said other def^{t} John Heming*es* a litle before the reedifieing of the said newe playhowse did freely geve & assure vnto him one moitie of the said p*ar*te of the said garden plott*es* & ground*es* but denyeth that he or to his knowledge the said oth^{r} def^{t} John Heming*es* hath the said assignement or graunt so supposed to be made by the said Anne to the said Compl*ainan*t or that he this def^{t} hath the said Last will & testam^{t} of the said Augustine Phillipps or the said dede whereby the said Augustine had onely a sixth p*ar*te of the said moitie of the said playhowse galleryes gardens & ground during the said terme of yeeres or the said originall lease made by the said Brend but he thincketh that the said oth^{r} def^{t} hath the same will dede & originall lease. And both the said def^{tes} Do say & confesse that a litle space before the reedifieing of the said playhowse they the said def^{tes} did enter into the said moitie of the said p*ar*te of the said moity of the said Garden plotts and grounds which was of the said Augustine Phillipps and doe yet keepe the same and from and after the reedifying of the said playhowse did and yet doe receiue and take the rents and proffitts thereof and doe keepe the same from the said Compl*ainan*t as well & Lawfull it was & is for them as they

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hope to doe, Without that that the said def^tes^ haue made or contrived to themselues or to any oth^r^ p*er*son or p*er*sons any estate or estates of the said p*ar*te other then is aboue men*ci*oned & one Eight p*ar*te of the said moitie of the said playhowse galleryes gardens & ground*es* graunted by the said def^tes^ & oth^r^ their p*ar*tners in the said moitie to Nathan ffield & one oth^r^ estate made to John Atkins gent in trust for the s*ai*d def^t^ John Hemings of two litle p*ar*cells of the said ground by the said def^t^ John Hemings & the rest of the p*ar*tners in the said Playhowse & p*re*misses vpon p*ar*te whereof the said John Hemings hath built a howse And without that that the said def^tes^ haue made or contrived to themselues or to any oth^r^ p*er*son or p*er*sons any secrett subtill or fraudulent estates of purpose to defraud or defeate the said Compl*ainan*t or oth^r^wise as in & by the said bill of Compl*ai*nt is very falsely & slaunderously suggested And w^th^out that that any other matter or thing in the said bill of Compl*ai*nt conteyned materiall or effectuall for the said def^tes^ or eith^r^ of them to answer vnto & herein & hereby not sufficiently answered vnto confessed & avoided denyed or traversed to these def*en*d^tes^ knowledges is true All wch matters the said def^tes^ & eith^r^ of them are ready to averre & prove as this Court shall award & do pray to be dismissed forth of the same wth eith^r^ of their reasonable cost*es* & charges in this behalf most wrongfully susteyned/

Seb: Kele:

[4]

REPLICATION.

x° die Maij Anno R*egni* Regis Jacobi
Angliae ffranc*iae* et Hib*er*niae xvij° et Scotiae lij^do^/

The Replicac*i*on of John Wytter gentleman Complaynant to the ioynt and seaverall Answeares of John Hem*m*ynges and Henry Condall gentlemen Defend^tes^.

The said Complayn^t^ haueinge to him nowe and at all tymes hearafter saued and allowed the benefitt of all exceptions and other advantages whatsoever to the incertaintie insufficiencie and im-

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perfections of the said Answeares of the same defend[tes] for Replicacion therevnto sayeth That his said Bill of Complainte against the same defend[tes] and either of them exhibited in this honorable Courte and all and everie the allegations matters thinges and clauses therein contayned are good lawfull perfecte and sufficient in the lawe in such sorte manner and forme as in the sayde bill the same are and everie of them is sett forth declared and expressed. And that the matters therein contayned are not nor anie of them ys to be iustlie avoyded dischardged or answered in this Courte by the said defend[tes] or either of them but are grounded vpon good and iust cause of suite as by the contentes thereof and better shall hearafter appeare herein to this honorable Courte. And further he the same Complaynante sayeth That the Answeares of the said defend[tes] are and either of them ys vncertaine imperfecte and insufficiente in the lawe to be replyed vnto, and likewise is most false and vntrue, And that the same Answeares are replenished and stuffed full of idle imperfecte and frivolous matters incerted onelie to put the Complaynante to needelesse and vnnecessarie chardges for the Copie, And all the same he the said Complayn[t] will averr and prove as this honorable Courte shard [sic] award. And the said Complaynante for further Replicacion sayeth and will aver and prove That the same defend[tes] or either of them haue not nor of late yeares had anie manner of right title or interest in or to the parte of the gallories of the play howse called the Globe, and of the [said] gardens and premises in the bill mencioned by the said Complaynant claymed by reason whereof the yssues comodities and profitts thereof should haue byne and yet ought to be still answered and payed to the said Complaynante by the said defend[tes] whoe haue vniustlie and without anie lawfull cause [or] good collour of tytle receaued and taken the same of theire owne meere wronge and apparante iniurie, and converte the same vndulie and wrongfullie to theire owne proper vse and behoffe beinge the principall and cheiffe staie and meanes of maynetenance for the said Complaynante and his wyeffe and Children. And for asmuch as it as yt evidentlie appeareth by their answeares

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of the same defend^{tes}, That the said Complaynante hath good interest and tytle to asmuch at the least (yf not more) as in the said Bill he doeth demaund and clayme wch was the parte of Augustine Phillippes deceased in the said bill named vnto him demised expresselie and by name amongest the rest by the said Nicholas Brend by his Jndenture tripartite wch came vnto his said wyeffe lawfullie after his decease and from her likewise vnto the said Complaynante by her graunte and assignement thereof vnto him wch is not in any sorte answered or avoyded by the answeares of the said defend^{tes} or of either of them the said Complaynante doeth demaund the iudgemente and order of this honorable Courte for the same parte of their first moytie in the said Answeares mencioned wherevnto they the said defend^{tes} neither doe nor can make anie good collour or pretence of lawfull right or tytle in lawe. And as vnto another parte by this Complaynante claymed in the other moytie of all the said premises wch the said defend^{tes} in like manner doe confesse to haue byne first the said Phillippes and secondlie the said Complaynant*es* wyves and thirdly was this Complaynant*es* owne afterward*es*, The said Complayn^{t} sayeth and will averr and prove That he should and ought to haue the same alsoe both in lawe and equitie for he the said Complaynant at the tyme of the makeinge of the said supposed release and longe after had and enioyed the same his said parte of the said other or late^{r} moytie of the premises without anie manner of lett disturbance denyall or claime of the said defend^{tes} or either of them or of anie other p*er*son or p*er*sons whatsoever. And the said defend^{t} Hem*m*ynges did after the tyme of the makeinge of the said supposed release accompte with the said Complaynante for dyvers yeares togeather for his parte of the profittes thereof, [and] did alsoe satisfie and pay him the same of right and duetie and not as he seemeth nowe falsely to pretend and meane by his said answeare of courtesie benevolence or gifte. And the said Complaynante alsoe sayeth and will averr and prove that the said Release neither did nor could dischardge nor alinate from him his said parte nor extinguishe or avoyde his said interest or tytle therein or to anie p*ar*cell of

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the premises by anie manner of meanes, nor yet hath the same Release sufficiente wordes therein for that purpose to bynde barr or tye this defend^{t} in lawe. And yf there weare sufficiente wordes therein by lawe to barr the said Complaynante therein (as theire are not) yet he ought not nor should be bound or barred thereby in equitie or iustice for that there was not any valuable or sufficiente consideracion or any cause at all gyven to the said Complayn^{t} or meaninge wherefore the same should passe or be transferred to the said defend^{t} Hem*m*ynges nor yet any word touchinge or concerninge the same. whereby the conscience and charitie of the said defend^{t} Hem*m*ynges by him soe much amplified and sett out in and by his said Answeare may truelie appeare whoe would carrie and drawe awaye from the said Complaynante soe much yearely revenewe and profitt whervpon he should alsoe lyve) for nothinge at all. And to satisfie this honorable Courte fullie for the matter of the Complaynant*es* release he further sayeth That theire was suite and controuersie at the tyme of the makeinge of the Release supposed to be made by the Complaynant) and before betwene him and the said defend^{t} Hem*m*ynges in an Action of trespasse vpon the Case for wordes alledged to be spoken by the said Complaynante against the said defend^{t} Hem*m*ynges to his sceandall or damage, to end and determyne wch Action or suite the Release had or gotten from the said Complaynante was onelie made and obtayned and to noe other end or purpose. And that it may plainely appeare to this to this honorable Courte theire was not anie intencion or meaneinge by such Release as this Complaynant made to the said defend^{t} Hem*m*yng*es* to take away from him or to barr him of any interest right or tytle he had or did clayme or pretend to haue vnto the demised premises or any parte thereof the said Complaynante sayeth that the same is manifest and cleare aswell by the same defend^{tes} Answeare as by his lease to the said Complaynante made as alsoe by the letter and offer therein to him sent by the same defend^{t} in the said Answeare mencioned and by his payment and satisfaction for the said Complaynant*es* parte and porc*i*on of the profittes and com*m*odities of the demised premises had made

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and answered vnto him longe after the tyme of the makeinge of the said supposed Release. And as vnto the entrie and tytle of the said Anne the Executrix into the same premises the lawe doeth expresse and sett downe howe and in what manner and forme shee should and ought to haue the same parte wch was to her devised and bequeathed if theire weare noe speciall and expresse kind of declaracion howe and in what sorte shee claymed the same when shee entered therein and claymed the same at the tyme of her enterie, wch will and must fall out to be verie cleare both in lawe and equitie on the said Complaynant*es* behalfe. And yet further to avoyde and take awaye the doubte and scrupull wch the said defend^t^ maketh against her and the said Complaynante therein he sayeth that the Condicion or provisoe in the said will and in the said Answeare rehearsed whervpon the said defend^t^ doeth incist ys not good nor availeble in our lawes nor yet in the Ecclesiasticall lawes of this Realme, nor in the imperiall or Romane Civill lawes whereby noe woman is to be bound or tyed from lawfull marriadge nor to lose or forfaite any executorshipp legacie or other matter or thinge to her devised bequeathed gyven or appointed as this case ys, for or by reason of mariadge. And yet yf the lawe weare otherwise and the said provisoe or Condicion good and of force in the lawe yet as this case ys) it cannot bynd or tye the said Complaynante or his right tytle or interest aforesaid nor yet benyfyt or helpe the said defend^t^ for asmuch as shee the said Anne the Executrix had first lawfullie and duelie proved the said will of her said former husband Phillipps and tooke vpon her the execution thereof whilest shee was his wydowe, and did alsoe afterward*es* and before her intermariadge with the Complaynante assigne and graunte the same vnto the said Complaynante (as shee well and lawfully might doe) before the said Condicion was broken and before the said defend^t^ Hem*mynges* any thinge had or could haue or clayme therein. And alsoe before he had the Executorshipp by him nowe claymed or anythinge to doe or intermedle for touchinge or concerninge the premises or executorshipp aforesaid. Whereby when and after the same lease or parte of the said Anne Phillipps was duelie and

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lawfully to the said Complaynante graunted or assigned by her the said Anne whilest shee was lawfull and sole executrix of the said testamente, the said defend[t] Hem*m*ynges could not afterwar*d*es drawe backe or regaine the same nor yet p*re*iudice the said Complaynant therein nor clayme the same by any good tytle or other meanes, nor yet was he or could he be any lawfull executor of the same will after shee had proved and accepted of the same neither could or might shee afterwardes when shee was maried relinquish the same and yeild it vpp vnto the said defend[t] Hem*m*ynges w[th]out the compl[tes] concent or that the same administration of the said deff[t] could be or was lawfullie com*m*itted to the said defend[t] Hem*m*yng*es* of the said goodes and Chattells of the said Anne Phillippes as his executor w[ch] if it weare not soe yet the said defend[t] Hem*m*yng*es* doeth by his said answeare make the matter cleare and plaine against himself for the said Complayn[t] in his expressinge and recitall of the said provisoe or Condicion in the said will to be that if the said Anne should at any tyme marry after his decease that then and from thenceforth shee should cease to be any more or longer executrix of his said last will or any wayes intermedle with the same. And that then and from thenceforth the said defend[t] Hem*m*yng*es* and the others therein nominated should be fullie and whollie his executors. Soe as it is very evidente and certaine that the full and whole power and authoritie rested in her solie all the tyme of her wyddowehoode at the least, and that duringe all the same time there could be none other executor nor any meanes or good coullor to alter voide or crosse her executorshipp graunte or assignement or any other matter or acte shee did as executrix duringe all the time of her wydowehoode w[ch] alsoe should and ought to contynewe and remayne good and effectuall after her intermarriadge with the said Complayn[t] beinge formerlie well and duelie made or executed. And for asmuch as the said defend[t] Hem*m*ynges confesseth the haueinge in his hand*es* and custodie aswell of the said release and the said deede whereby the said Augustine Phillipps had a fifth part of the moitie of the said play howse galleries gardens and ground*es* duringe the said tearme of yeares yet induringe,

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And the said last will and testament of the said Augustin Phillippes As alsoe the said orriginall lease to him and others made by the said Nicholas Brend wch lease the same defend^t^ confesseth he keepeth to the vse of himself and the rest wch haue any interest therevnto (whereof the said Complayn^t^ is one whoe neither did nor yet doeth consent therevnto) he humbly desireth that all the same may be brought into this Courte by the order thereof And that a ducens tecum may be therein awarded for the same accordinglie against him And whereas the said defend^tes^ doe labour and trouble themselues to abate and pull downe the value of the Complayn^tes^ parte as yf it weare litle worth and make a greate matter of his non payemente of his porcion of the rente wch he never payed but out of the profittes of the same and of the newe buildinge of the said play howse and galleries to answeare the same fullie and to gyve good satisfaction to this honorable Courte therein he sayeth and will averr and proue that the yssues profittes and rentes of the reasidewe of the said demised premises over and besides the play howse and galleries will satisfie and pay (as yt was still vsed and accustomed to paye) the whole rente reserved to the said Nichalos Brend. And for the full proofe and manifestacion thereof he the sayed Complayn^t^ sayeth that he doeth and will offer to accepte and take to himself solie for all his partes all the reasidewe of the howses buildinges gardens and groundes soe demised by the said Nicholas Brend (exceptinge onelie the said playhowse and galleries wch the said defend^t^ and the rest (other then the said Complayn^t^) shall and may solelie haue retaine and keepe to themseules for and in consideracion of the said residue, And that he the said Comp^lt^ will alsoe for the same satisfie and pay all the said yearely rentes reserved vpon the said lease and geeve good securitie for the paym^t^ therof out of the same residewe soe as he may haue and enioy the same w^th^out any other chardge or incumbrances according to the said lease of the said Brend notw^th^standinge he is and ought to haue his parte aforesaid in all the same premises dischardged and freed of incumbrances and chardges exceptinge the same rent thervpon reserved over and aboue wch rent he the said Comp^lt^: hath hearto-

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fore had and receaued de claro p*er* ann*um* betweene thirtie and fourtie pound*es* and byn answered soe by hand*es* of the said def^{t} John Hem*m*ynge*s* for diu*er*s and sundrie yeares for a seaventh p*ar*te onely when all the said p*re*mises weare not of that yearely value by much as they now are. without that that the said Anne did not make the said Assignem^{t} of the said tearme of yeares and interest of and in the fifth p*ar*te of the said moitie to the said Comp^{lt}: before theire intermariage as by the said def^{t} Hem*m*inge*s* is vntrulie suggested and surmised and wthout that that after theire said intermaringe the said Comp^{lt} claymed the same p*ar*te onelie or in the right of the sayd Anne as executrix of the said Augustin Phillipps or if he had soe done that the same is materiall or that the said assignem^{t} made vnto the said Comp^{lt}: was, is, or can be voyde in lawe, Or that by the said deede in the answeare of the said def^{t} Heminge*s* menc*i*oned the said Auguistin Phillipps had onely a fifth p*ar*te of the moitie of the said play howse galleries gardens and ground*es* during the tearme of yeares thereby demised and yet induringe in manner and forme as in the said def^{tes} answere is alleadged. And wthout that that the said Comp^{lt}: had fourescore pownd*es* or any like or greate some at all out of the hand*es* of the said def^{t} Heminge*s* after that he had receaued the some of three hundred pownd*es* of Sr Eusebeus Jsam, Or that the same def^{t} lawfully did or could enter into the said fifth p*ar*te of the said moytie of the said play howse galleries gardens and ground*es* or could lawfullie take the rent*es* issues and profitt*es* thereof, Or that well it was for him soe to doe in manner forme as is alsoe in theire said answeare vntruly is [*sic*] surmised And wthout that that the said def^{t} in charitie and to releeue the said Comp^{lt}: and the said Anne and her Children did from time to time diu*er*s and many tymes or anie time at all deliver to them or to either of them diu*er*s som*m*es or anie some at all of mony as in the said Answeare is falselie and vntrulie alleadged. Jn thexpressinge whereof in and by the said answere the same def^{t} vseth a litle of his smale con*n*ing and craft (wch cannot helpe him) not onelie in his alleadgeing it to be a greate some wch is soe greate as he was and well might be ashamed or abashed (yf anie

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shame at all he had) to expresse anie some at all, but alsoe in this pointe especially that he vnder the coullour of his accomptinge wth him and paying the said Comp^lt^: and his said wyeffe such money as was often times to them or to one of them due and payable of right and dutie for theire profitt*es* and com*m*odities of the said demised p*re*mises by him then receaued wch was soe payed and answered accordinglie and not otherwise then as a pigge of his owne sowe would newe Cloke and coullor the same (as he indeavoreth) to be by him done and gyven out of charitie and to releeue the said Complaynt and his said wyeffe and Children wherein to make the dissimulac*i*on and hipocracie of the same defendt more notorious and rem*ar*kable it shall evidentlie appeare to this hono^ble^ Courte that he is soe farr from all charitie and good dealinge that he will not without compulsion paie and satisfie the said Comp^lt^ soe much by a greate deale as is to him due and answerable both in lawe and equitie, and for wch he hath noe good coullo^r^ nor pretence of right or title vnto but would for verie little or rather noe consideracion at all take and gaine to himself a matter of great profitt and worth and the onelie staie and state wch the said Comp^lt^ hath leafte to liue and to releeue himself his wyeffe and Children And that there is nothing at all to him payed or answered for or in respecte of the same wherein he mightilie (although in vaine) racketh and stretcheth his wyttes for verie poore and simple shiftes quirkes and galles to coullor and sett forth the same as the said release w^th^out consideracion and the false recitall of his lease by him made and the nonpaym^t^ of the said Complaynt^es^ parte of the said rente, And alsoe the non paym^t^ of fiftie pownd*es* for his p*ar*te to reedifie and newe build the said play howse and galleries, whereas the same defendt not onelie ever had more then sufficient of the said Complaynt^es^ money to him due in the hand*es* and custody of the same defendt to paie the said rent but alsoe hath and longe time haue had farr more money of the said Complaynt^es^ out of the rent*es* and profitt*es* of the demised p*re*mises then he did demaund or requier for the newe buildinge therof or then his p*ar*te or porc*i*on doeth or can amounte vnto for the reedifyinge therof wherein he sayeth and is informed

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by his Councell learned in the lawes that he is not nor was tyed or bound by the lawe to contribute to the newe buildinge of the same wch the said def^tes^ and some other of theire p*ar*tners and fellowe players did in theire defaulte suffer to be burnte and consumed willfullie or at the least verie negligently And the said def^t^ Hem*m*yng*es* hath adioyninge therevnto vpon the same ground and soile soe therew^th^ demised and letten as is aforesaid a faire howse newe builded to his owne vse for wch he payeth but twentie shillinge*s* yearely in all at the most And noe p*ar*te of the same rent to the said Complayn^t^ whoe should haue his said p*ar*te*s* and porc*i*ons of and in the same howse wch howse will in a fewe yeares yeild a greater some in rente then the newe buildinge of the said play howse and galleries did cost wch is and will be more chardgeable to repaire then the former was And w^th^out that that the said Complayn^t^ is or ought to be barred by the said release both in lawe and equytie or by either of them of anie of the said parte*s* by him claymed or challenged in the said demised p*re*mises And as vnto the said letter and the lease in the said answeare menc*i*oned supposed to be made by the same defend^t^ the said Complayn^t^ sayeth that the same and the recitall therein alsoe and the forfaiture therof are idle and imp*er*tinent matters nothing materiall to him nor to the cause now in question And that the same lease was invented procured and gev*en* when the said Complayn^t^ was pore and distressed by the said defend^t^ to stoppe and w^th^hould him from his said former estate tytle and lease wch the same def^t^ would not dep*ar*te wth nor restore to the said Comp^lt^ after his repaym^t^ of the said fiftie pownd*es* wth fiftie shillinge*s* interest vpon the said mortgage but most vnconcionably inuriouslie and vnduelie detayned and w^th^held from the said Comp^lt^ to drive him to take the said newe estate or last lease to prevent the same defend^t^ wherein the said Comp^lt^ by the advise of his said Councell was willinge and desireous to relinquish the same wherein alsoe the charitie and releefe of the said defend^t^ wherof he bosteth and braggeth w^th^out cause severall times may alsoe appeare whoe would take advantage thereof or of anie thinge else he could w^th^out gyving of anie recompence or con-

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sideracion to the said Complaynt for or in respecte of the same lease. And as vnto the same defendt his gifte of the said tearme of yeares and interest of and in the one moitie [of] the said parte of the said moitie of the said garden plottes and ground to the said other defendt Henry Condall gratis the said Complaynt sayeth That the same is alsoe idle and frivelous matter wherein the said defendt Hemmynges sheweth howe liberall he could be of another mans goodes and lease and what lardge thounges he can cutt out of another manns hide wch he would not haue done of or for that wch was his owne and did that but to haue helpe and assistance to ioyne with him to keepe out and wrounge the said Complaynante therein as was and is done to the benefitt of either of the same defendtes whoe would share and devide all that parte and portion of the said Complaynante betweene them the said defendtes wch for the said defendt Hemmynges (as the proverbe sayeth) is but a kind of robbinge, to robbe Peter to pay Paulle And therefore finallie forasmuch as the same defendt Hemmynges is soe litle behoulden to his neighbours that he is inforced to be the trumpeter and setter forth of his owne praises or commendacions and driven to magnifie and extolle himself and his virtues (wch he soe much without all cause coveteth) to helpe the same, and to geve the said Complaynt and his frendes iust occasion soe to doe and publishe his pyttie and Charitie vpon iust occasion, he sayeth that the said defendt Hemmynges may easilie procure the same by sufferinge the said Complaynt to haue soe much from him out of his parte and porcion of the said demised premises as he confesseth he hath geven gratis to the said other defendt Coundall for wch he shall not onelie haue verie many thankes and good reportes and that right worthelie and deservedlie but alsoe shall verie desirouslie be duelie payed yearelie thirteene pownds six shillinges and eight pence by the said Compt: for the same and haue securitie and assurance for the performance and accomplishmente thereof, wch because it is much more worth, he is well assured the said defendt Hemmynges will not either out of his pittie and charitie or out of his bountie and liberalitie or anie other of his vertues (whereof he is soe much defective and insensible) accepte or take notwth-

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standinge anie charitable request and good offer that the said Complaynt can or will make, wherby and in the rest before herein recited the whole truth may evidently appeare, and here like himself he the same defendt sheweth himself in his said Answere, and in the matter wherein with fallacies and decieptes he indevoreth and seeketh to shadowe and obscure the truth and to abuse this honorable Courte, of all wch the said Complaynt prayeth the due consideracion of this honorable Courte And lastly without that that anie other matter thinge clause sentence cause or article whatsoever materiall or effectuall contayned or mencioned in the said Answeares of the said defendtes or either of them, And by the said Complt: to be replyed vnto and not herein before sufficientlie confessed and avoyded traversed and denyed or otherwise replyed vnto is true. All and everie wch thinges matters and allegacions the said Complaynt is and wilbe readie to averr and prove as this honorable Courte shall award. And prayeth as he before in his said bill hath prayed./

John: Walshe

[5]

Witness Book, 16 James I to 1 Charles I, Miscellaneous Books, vol. 200.

[List of witnesses examined *ex parte* Witter Hilary Term, xvij° James I (1620).]

John Witter gent
pl*aintiff*

John Heminges and
Henry Condall gent
deftes

Thomas Woodford gent
James Knasborough gent

[6, 7]

[The depositions of Thomas Woodford and James Knasborough, taken February, 1620, are wanting.]

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[8]

Decrees and Orders, Miscellaneous Books, vol. 29, p. 598.

[Badly damaged. Outer edges rotted away.]

Termino Trinitatis Anno 17°

28° Maij A° 17° et 52°

[Towchin]g the cause at the sute of John Witter compl^t against John Heminge*s* [and] Henry Condall def^tes vpon the mocion of m^r Wilbraham of [councel]l wth the said compl^t yt is ordered that the said def^t Heminge*s* [having con]venyent notice of this order shall attend this court . . . t wth the lease & deede of mortgag[e] mencioned in the [bill of Complaint] . . . shall then at his p*er*ill shewe cause whie the . . . [deli]u*er*ed into the safe custody of this court . . . ma^tes Councell in this court shalbe thou[ght] . . . layde out vpon the said mortgage being . . . ed in his answere to be receaued(?) at the day . . . ith . . . due for the same And further it is ordered that . . . the said def^tes answere shalbe referred to the . . . retayned, who is requyred by this court to . . . imp*er*tinencie thereof and to report his opinion . . . and therevpon the further order of this court [shall proceede as to ius]tice shall app*er*teyne./

[9]

In eodem, p. 613.

[Very badly damaged. Only a few words, on the inner margin, remain. The rest of the page is rotted away.]

Quinto die Junij A° &c 17° et 52°

Witter
Heminge*s*

Towching [the caus]e at the [sute of John Witter complainant against John] Heminge*s* and Henry [Condall defendants].....
of Councell on both .....
p*ar*ties shall p*ro*ceede.....
in the meane.....
in the form*er* order.....
& p*re*sence(?) shalbe set.....
for any form*er* order.....

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[10]

Decrees and Orders, Miscellaneous Books, vol. 30, fo. 761.

[Final decree, dismissing the case forever.]

xxix die Novembris A° &c 18° et 54°

Witter Hemingᵉˢ Whereas John Witter long sithence exhibited his bill of complaint vnto the Kingᵉˢ maᵗˡᵉ & his highenes Counsaill in his ho: Court of Whitehall at Westminster against John Hemmingᵉˢ gent & Henry Cundall deftᵉˢ, Vnto wᶜʰ Bill the said deftᵉˢ forthwᵗʰ made theire full and perfect answeres, Wherevnto the complᵗ replyed & examined certen witnesses above two Termes now past, & hath ever sithence fayled to proceed in his said cause as by the due & ordinary course of this court he ought to haue done It is therefore by his maᵗᵉˢ said Counsaill of this court ordered that the same matter be from henceforth out of this court cleerely & absolutely dismyssed forever, & the said deftᵉˢ are licensed to departᵗ at theire liberties sine die, And it is further ordered that the complainant shall vpon sight or knowledge hereof content & pay vnto the said deftᵉˢ the full somme of xxˢ for theire costᵉˢ herein most wrongfully susteyned./

III.

THE KEYSAR-BURBAGE CASE.

When Shakespeare and six of his theatrical associates in 1608 leased the Blackfriars theatre of Richard Burbage, they did it only after carefully protecting their rights against any claims of the former lessee and sharers who had been managing there the famous company of boys known in Elizabeth's reign as "The Children of the Chapel" and under James I as "The Children of the Queen's Revels." For certain satirical skits on their stage against the English King, and finally against the French King, this Children's company was suppressed by the drastic order of James I in the early spring of 1608, as shown by still other new

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records to appear in the third volume of *The Children of the Revels.* Thereafter the Blackfriars stood vacant until taken by the Burbage-Shakespeare company, August 8, 1608, as first related by the Osteler-Hemynges records and the following new set of documents.

Out of the suppression of the Children's company and the later transfer of their theatre to the Burbage-Shakespeare company, differences arose among the former sharers resulting in numerous bitter suits at both law and equity, which furnish us with much of our information concerning the history of Blackfriars theatre. Some of these suits have been published, from James Greenstreet's transcripts, in F. G. Fleay, *A Chronicle History of the London Stage* (1890), while a first account of others appeared in the London *Times,* September 12, 1906, and extracts and data from these and several others besides, all yet to be published *in extenso,* as announced, were presented by me in *The Children of the Chapel at Blackfriars 1597–1603* in *University Studies,* April-July, 1908.

The quarrel did not confine itself to the former tenants of the Blackfriars. One suit, six months after the above transfer, was directed by Robert Keysar, goldsmith, a shareholder in the defunct Children of the Queen's Revels company, against the new lessees, the records of which constitute the set of nine new documents from the Court of Requests published in the present section.

The Bill of Complaint is based upon promises claimed to have been made by Richard Burbage, Cuthbert Burbage, John Heminges, Henry Condell, "and others" of the company. Shakespeare is not specifically named, and may or may not have been one of those to whom Keysar says he repaired and of whom he received certain promises in reference to the Blackfriars. But since he was one of the members of the company, this suit, praying for no less than a one-sixth interest in the theatre and its profits, vitally concerns Shakespeare and all the other sharers of the company alike.

A study of these records will yield corrective and new results worth the time to any one familiar with previous histories.

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Robert Keysar has long been known to me among unpublished theatrical records, although only one printed document mentions him, quite incidentally, as "one Keysar." He is, in fact, a prominent owner in the Children of the Queen's Revels at Blackfriars in and probably before 1608, and thereafter, in connection with Woodford, Rosseter, and others, of the new company at Whitefriars under the old name of Children of the Queen's Revels. He secured his first interest through purchase of a share in the Blackfriars company from John Marston, the dramatist, and was to the poets and players there, from some of the unpublished records just referred to, the Philip Henslowe of the organization, who lent some of them money on different occasions.

Up to 1601, the date of *Poetaster,* Ben Jonson and George Chapman were the sole poets of the Blackfriars Children. Thereafter Jonson wrote for other players, and Chapman and Marston became the exclusive Blackfriars poets from that date to the suppression in 1608. Marston now turns out to have had a financial interest in the Children's company at Blackfriars, which may explain a few allusions not before clear. He was thus their Shakespeare, being poet and sharer in one. The date of his acquisition of a share is not known. Just when he ceased his connection as dramatist and shareowner with the Blackfriars these documents do not openly declare. But it is made evident from Keysar's reported conversations with the Burbage-Shakespeare company relative to their contemplated lease of the theatre and his own contemplated purchase of Marston's share for 100*l.* at that time, that the transfer occurred and Marston's connection ceased about the date of the suppression, perhaps in the spring of 1608. Since we know from a published document that "one Keysar" was interested in the Blackfriars before its suppression, even to the extent of paying rent, and from yet others that the negotiations for transferring the Blackfriars lease had been considered by Evans, the lessee, and Burbage, the owner, for a long time before the transaction was completed, it is possible that the deal between Marston and Keysar was made in 1607.

At the date of Cuthbert Burbage's affidavit, June, 1610, John

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Marston as one of the material witnesses to be summoned is " clerk," or preacher, of Barford, Wiltshire, near the residence of his father-in-law, who, Ben Jonson ten years later jokingly said to Drummond of Hawthornden, wrote all of Marston's plays for him, while Marston wrote his father-in-law's sermons.

The depositions of witnesses mentioned in Cuthbert Burbage's affidavit as material to the defendants would, if they existed, greatly enrich the history of the Blackfriars. For further comment on these, see bracketed note at close of the affidavit.

The largest point of interest in the new documents centres about Keysar's charge that the Burbage-Shakespeare company had formed a theatrical trust by buying up all the private theatres, and suppressing such as they did not want to conduct. The only private theatres then were Blackfriars, Paul's, and Whitefriars. The defendants admit only a part of the charge, namely, that they did purchase the Blackfriars and have also paid their half of a dead rent of 20 *l.* for the year to Edward Pierce, Master of the Paul's Boys, to keep that theatre closed. The proprietors of Whitefriars, they say, paid the other half.

How and why Paul's Boys ceased to act has been explained in a variety of ways. These documents furnish the single needed word of fact that settles the question. Whether they acted in some part of the Church or outside is likewise removed from speculation.

These documents unite with others to show how, when, and by whom the company called the Children of the Queen's Revels at Whitefriars was organized.

In this introductory word, I do not wish to verge upon analysis of the records, nor even to attempt to suggest the new items of fact. That must be deferred to later publications. I desire here merely to give a brief, general notion of the documents, which speak to the literary-historical student entertainingly and instructively for themselves.

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[1-9]

KEYSAR VS. BURBAGE ET AL.

Court of Requests Proceedings, James I, Uncalendared. Case of Robert Keysar vs. Richard Burbage et al. (Recently withdrawn from circulation, and now preserved separately.)

[Four skins, consisting of Bill 25½ × 17¾; Answer, 24 × 16½; Replication, 23 × 17¼; Rejoinder, 27½ × 11¾; all written clearly, with lines running the long way of the parchments. The chirography is the usual beautiful modified Gothic of the period. Both ink and parchment perfectly preserved.]

[1]

BILL.

[*In dorso*] viij° die ffebruarij Anno Regni Regis Jacobj Angliae etc septimo et Scotiae xliij^co^

Defendentes vocentur per Mandatum nuncij Cameræ

To the Kinges moste excellent Matie./

Humblie Complaininge sheweth vnto y^r^ moste excellent Matie, y^r^ highnes Loyall and Obedyent Suplyaunt Robert Keysar Citizen and Goldsmith of London, That wheiras one Richard Burbage gent, was and still ys seised of an estate of inheritaunce in fee or fee tayle of and in an one great Hall or roome, wth Certaine roomes over the same, sett and beinge in the Blackfryers London, erected furnished and buylt wth Stage Gallaryes and seattes, and beinge soe seised did for the tearme of Twentye and one yeares demise the same to one Henrye Evans at the yearlie Rent of fortye pounde, quarterlye to be paide dureinge the said Tearme wch in effluction of tyme ys not yet expired by manye yeares, By force and vertue of wch said lease, he the said Henrye Evans did theirinto enter and was theirof lawfulie possessed, & beinge theirof soe possessed, he the said Henrye Evans did for good and valuable Consideracion afterwardes grant all or some parte of the said Tearme the Certaintye y^r^ Suppliant knoweth not, to one John

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Marston Gent, who by force and vertue theirof did enter in and vpon such parte and soe much theirof as was ment and intended to be to him graunted, and was accordinglie theirof possessed, and beinge soe possessed, and havinge allsoe one full Sixt parte of and in Certaine goodes apparell for players, propertyes, playe bookes and other thinges then and still vsed by the Chilldren of the Queenes ma^tyes^ Revells in and aboute their playes, enterludes and other exercises by them to be acted, shewed, exercised or done, in the said great Hall, or roome, or elswhere, by good Conveyance from the said Evans and others, for the full value of wch said goodes and premisses was at a verye lowe and reasonable appraizment woorth Six hundred pounde at the leaste, he the said John Marston and y^r^ nowe Suppliant did fall into speach and Communication touchinge the buyinge of his the said John Marston right, Tytle, and interest, of in and to the full Sixt parte of the lease afforesaid & of all & singuler his right & interest of in & to the said sixth parte of ye said goodes, apparell for players, propertyes, playe bookes, and other thinges wch then he had or wch afterwarde was to be had by reason of his ioynt partnershipp wth others theirin, and of the Sixt parte of all the proffitt and Commoditye to be made theirof and theirby dureinge the Contynuance of the said lease; And in the end it was fullie concluded and agreed by and Betweene y^r^ said Suppliant and the said John Marston that for and in consideracion of one hundred poundes to be in hand paide by y^r^ said Suppliant to the said Marston for the full Sixt parte of all and singuler the premisses, he the said Marston should conveye his right and interest theirin and theirvnto to y^r^ said Supliant but y^r^ Suppliant vnderstandinge that their were divers partners in the said lease, goodes and proffitt to be made as afforesaid, and feareinge y^t^ by some practize and confederacye betweene the sayd Richard Burbage, Henrye Evans and then y^r^ Suppliant might be defeated and Cosined of all or of the greatest parte theirof, and w^th^all havinge hard some rumors and flyinge speeches to that purpose wch did increase his feare, y^r^ said Suppliant did make his repaire to the said Richard Burbage and vnto one Cuthbert Burbage, John Hemminges, Henrye Con-

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dell & others beinge all partners, and the onlie partners that might preiudize and wronge y^r^ Suppliant in the premisses, and told them that he had Concluded and agreed wth the said Marston for a full Sixt parte in the premisses, and that he had or was presentlie to paye to the said Marston one hundred poundes for the same, and both prayed them and told them that he hoped they would take noe such Deceiptfull and iniuryous Courses to hurt or hinder him as had beene reported and bruted abroade that they or some of them would, wheirvnto they all replyed that they had intelligence that he y^r^ said Suppliant had Concluded wth the said Marston as afforesaid, and that he eyther had or was then shortlie to paye to the said Marston one hundred poundes for his Sixt parte in the premisses as afforesaid, and w^th^all promissed to y^r^ said Suppliant at the same tyme, and told him that notw^th^standinge that the said Henrye Evans had beene treatinge and persuadinge wth them to some such act as might tend to his hinderance and losse therein yet that they would never yeald to any such matter vntill all partners and partyes interessed in the said Lease, goodes, & proffitts to be made as afforesaid were fullye satisfyed and paide whatsoever was to them due in Lawe or Conscyence or wordes to the same effect, And vpon this faythfull promise so generallie made by them all, y^r^ suppliant did paye his said one hundred pounde to the said Marston and the rather bycause if y^r^ Suppliant would have ioyned to have soulde his said Sixt parte wth others that had equall interest theirin, they did then offer to have given ffower hundred pounde for the same, Notw^th^standinge all w^ch^, and that y^r^ Suppliant had endeavoured to prevent all dishonest practize by repaireinge to them as afforesaid, and that they had by their faithfull promisses and offers encouraged y^r^ Suppliant to proceede and to paye his monye yet notw^th^standinge and by the givinge of some small peece of monye to the said Henrye Evans to the end that he would Surrendo^r^ vp the Originall lease to the said Richard Burbage; wch he the said Burbage had made formerlye to the said Henrye Evans of the said Hall & Roomes in the Blackfryers as afforesaid, he the saide Evans did Surrendo^r^ the same, by meanes wheirof they the said Richard Burbage,

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Cuthbert Burbage, John Hemminges, Henrye Condell and others, have entred in and vpon the said playe howse, and all the said goodes, apparell and premisses and have soe Continewed in the possession for a longe tyme and made proffitt theirof to themselves to the full valewe at the leaste of fifteene hundred poundes, a full Sixt parte wheirof in all equitye and Conscyence doth of right belonge vnto y^r^ Suppliant, but being vniustlie kept out of possession hath not beene by them nor anye of them permitted to doe or performe that wch for his ratable parte he ought and was moste readye and willinge to have done: In tender consideracion wheirof and because they the said Evans, Richard, and Cuthbert Burbage, John Hemminges, Henrye Condell and divers others doe well knowe that y^r^ said Suppliant did paye his said one hundred pounde to noe other end but to have had & enioyed his said Bargaine, and that he hath noe meanes to recover the same againste anye bodye but such as have vniustlie defrauded him, and that they onlie are the said partyes and noe other, and because y^r^ said poore Suppliant in hope to have enioyed his said Bargaine hath kept boyes theise Two yeares to his exceedinge Charge of purpose to have Continewed playes in the said howse vpon the ceasing of the generall sicknes, and hath disbursed by that meanes and by makeinge provision in the said howse for the purpose afforesaid five hundred pounde, and because all the said partyes vpon the repaire of y^r^ Suppliant vnto them and acquaintinge them wth that wch he had in purpose to doe, and wth that wch had beene rummored abroade Concerninge their intention to doe him wronge in the premisses and his earnest request vnto them not to preiudize him theirin did faithfullie promisse y^r^ Suppliant not to ioyne in any act to the hinderaunce of anye man vntill all men interessed theirin had satisfacion, and that vpon the said faithfull promise y^r^ Suppliant did conclude and paye his said hundred pounde, and because if remmedye be not had in this honorable Courte for y^r^ Suppliantes enioyinge the said full Sixt parte of the said goodes, apparell and the premisses wth a full Sixt parte of all the proffitt made in this meane tyme, that then y^r^ Suppliant shall loose his said hundred pounde soe longe forborne and all the

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charges that he hath beene at wth boyes and makeinge p*ro*vision to the value of fyve hundred pounde as afforesaid, it will tend to his exceedinge great charge for y^{t} he is voyde of all rem*m*edye at at the Com*m*on lawe eyther againste the said Marston or any other of the said partyes; That theirfore y^{r} ma^{tie} wilbe graciouslye pleased in a case of such nature and consequence to grant to y^{r} said Suppl*ian*t y^{r} highnes writt of Privye seall or the messenger of the Courte to Call into this ho^{ble} Courte the said Richard Burbage, Henrye Evans, Cuthbert Burbage, John Hem*m*inges and Henrye Condell Comaundinge them and everye of them by a certaine Daye and vnder a certaine paine theirin to be limitted to be and appeare in this ho^{ble} Courte of Whytehall before y^{r} ma^{tie} & y^{r} highnes Councell of the said Courte then and their to aunswere to the p*re*misses, and further to stande to and abyde such further order and Direction theirvpon as to y^{r} highnes Councell of the said Courte shall seeme to be agreable to Equitye and good Conscyence, & y^{r} highnes said Suppl*ian*t shall as he is neverthelesse bounde praye to god for y^{r} highnes longe liffe and happye Raigne over vs././

Raphe Wilbraham.

[2]

ANSWER.

xij° die februarij Anno R*egni* R*egis* Jacobi Angli*ae* ff*ranciae* et Hib*erniae* septimo et Scotiae xliij°./

The ioynt and seuerall aunsweres of Richard Burbage Cuthbert Burbage John Heminges and Henry Condell foure of the defendant*es* to the bill of Complaint of Robert Keysar Cittizen and Gouldsmith of London

The said defendant*es* and each of them saveinge vnto him and them selves at all times hereafter all advauntages of exception vnto the vncertenties and insufficiencies of the said bill of complaint for full and p*er*fecte aunswere vnto the said bill or so much thereof as any waie concerneth them the said defendant*es* or any of them, they the said defendant*es* and each of them for himselfe sayth

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that the said bill of Complaint as they are verely perswaded is onely preferred against them for molestacion and vexacion sake and thereby to putt these defendantes to vnnecessary and great charges in suites of lawe without iust cause so to doe, And further they the said defendantes for themselves and each of them for himselfe saith that true it is as they and each of them beleeve and are verely perswaded that the said Richard Burbage is seised of and in an estate of inheritaunce of and in all that great hall or roome with certeine other roomes ouer the same sett and beinge in the Blackefryers in London erected furnished and buylt with Stage Galleries and seates as in and by the said bill of Complaynt is sett forth and declared and the said Richard Burbage for himselfe sayth that true it is that he the said Richard Burbage did heretofore for the terme of one and twenty yeares demise the same vnto the said Henry Evans one other of the defendantes in the said bill of Complaint named at the yeerely rent of fortie poundes to be paid quarterly duringe the said terme which said terme of one and twenty yeeres is not yet expired by force and vertue of which said lease he the said Henry Evans did enter in and vppon all and singuler the said premisses and was thereof lawfully possessed as in and by the said bill of Complaynt is sett forth and alleadged, But whether the said Henry Evans did for good and valueable consideracion (or any consideracion at all) graunt all or any parte of the said terme vnto John Marston gent in the said bill of Complaint named or whether the said Marston by force and vertue of any such graunt entred into or vppon such or any parte of the premisses as in and by the said bill of Complaynt is supposed theise defendantes or any of them cannot certeinely depose for that they nor any of them were at any time present at preuie consentinge or acquainted with any dealinges and bargaines made or supposed to be made by or betweene them the said Henry Evans and John Marston neyther doe they or any of them knowe that the said Marston had any such or any parte at all in all or any the goodes apparell for players properties playe bookes and other thinges then now or at any time vsed by the Children of the Queenes Ma^tes^ Revelles in and about their

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playes enterludes and other exercises by them to be acted shewed exercised or done in the said great hall or roome or elswere as in and by the said bill of Complaint is suggested. And these defendant*es* vtterly denie and eu*er*y one of them for and by himselfe vtterly denyeth that the said Complaynant did at any tyme repaire or come vnto these defendant*es* or any of them and acquainte or tell them that he the said Complaynant had concluded and agreed with the said Marston for a full sixt p*ar*te in the p*re*misses, and that he had or was p*re*sently to paye to the said Marston one hundred pound*es* for the same or vsed any such Communicacion to or with all or any the said defendant*es* or that they or any of them made him the said Complaynant any such p*ro*mise or replyed as in by the said bill of Complaynt is also most vntruly surmised, and these defendant*es* allso vtterly deny and euery one of them for and by himselfe vtterly denyeth that they or any of them did at any time make any such offer vnto the said Complaynant to giue him foure hundred pound*es* or any other some or somes of money in such manner and forme as in the said bill of comp^lt^ is sett forth and declared, or that they or any of them did at any tyme aduise or encourage the said Complaynant eyther by their or any of theire p*ro*mise offers or otherwise to p*ro*ceede and to paye the said Marston the said hundred pound*es* or any other some or somes of money as in and by the said bill of Complaynt is allso most vntruly alleadged. But these defendant*es* say and each of them for and by himselfe sayth that true it is that the said Henry Evans haveinge entred into one bond or obligacion of foure hundred pound*es* vnto the said defendant Richard Burbage for true payment of the said rent of forty pound*es* p*er* annu*m* and into diuers Couenant*es* for repa*ra*cions to be done in and vppon the p*re*misses and p*er*formance of other matters agreed by and betweene them the said Richard Burbage and Henry Evans as by the said bonde & Jndenture of lease wherevnto these defendant*es* for the more certeinty doe referre themselves doth and may appeere and that by reason the said p*re*misses lay then and had longe lyen voyde and without vse for playes whereby the same became not onely burthenson & vn-

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profitable vnto the said Evans but allso ranne farre into decay for want of repa*r*acions done in and vppon the p*re*misses they the said defendant*es* or some of them entred into Communicacion with the said Henry Evans aswell for satisfaction of the said bond & Couenant*es* then forfeited vnto the said Richard Burbage as for the repairinge of the p*re*misses & soe mayneteynynge the same for & duringe the tyme to come vnexpired demised in and by the said lease in due and necessarie repa*r*acions which he the said Henry Evans fyndynge himselfe as these defendant*es* are verely p*er*swaded vnable to p*er*forme and beinge vnwillinge any longer to charge himselfe with so great and vnnecessary a burthen he the said Evans began to treate with the said Richard Burbage about a surrender of the said Evans his said lease which fynally for and in regarde of some Competent Consideracion giuen him in recompence of his the said Evans his Charge form*er*ly bestowed in building*es* in & about the p*re*missed was accomplished and the said Evans his whole estate of in & to the p*re*misses was surrendred by the said Evans vnto the said Burbage who accepted the same surrender accordingly (without knowinge of or intendinge to preiudice the estate of the said Marston or the Complaynant or eyther of them,) as he hopeth it lawfull was for him to doe especially the p*re*misses beinge in such decay for want of repa*r*acions as then they were, & the said defendant*es* Confesse that true it is that sithens the said surrender made by the said Evans to the said Richard Burbage as aforesaid which was about the tenth of August last past they the said defendant*es* have entred into occupied & enioyed the said great hall or play house & taken the benefytt & p*r*ofytt thereof & have reiected the said Complaynant from intermedlinge with them in any sort as they hope vnder fauor of this honorable Court it lawfull was & is for them to doe, but they the said defendant*es* & eu*er*y of them for himselfe doe vtterly deny that they or any of them haue at any time intermedled with had enioyed or received any the goode*s* or appa*r*ell mencioned in the said bill of Complaynt or have at any time converted them or any of them to theire or any of theire owne vse vses benefitt or behoofe without that that to the knowl-

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edge of these defendant*es* or any of them the said good*es* & p*re*misses were at any time worth at a lowe & reasonable apprays-ment the valew of six hundred pound*es* at the least or that the said Complaynant paid in hand one hundred pound*es* to the said Marston for the full sixt p*ar*te of all & singuler the p*re*misses or that these defendant*es* haue made fifteene hundred pound*es* p*ro*fitt of and by the p*re*misses at any time since the said sur-render made as aforesaid or that the said Complaynant did pay the said some of one hundred pound*es* if he paid any to the said Marston to no other ende but to have & enioye his said bargaine of & in the p*re*misses, or that the said Complaynant hath to that onely ende and purpose kept boyes by the space of two yeares last past to his exceedinge Charge, or that the said Complaynant hath disbursed by that meanes & by makeinge p*ro*vision in the said house for the purpose aforesaid five hundred pound*es* or any other some or somes of mony at all as in & by the said bill of Complaynt is suggested, and without that that any other acte matter or thinge in the said bill of Complaynt Conteyned & herein not sufficiently aunswered vnto Confessed & avoided trav*er*sed or denyed is true, all which these defendant*es* & each of them are ready to averre & p*ro*ve as this honourable Court & the M^rs^ thereof shall awarde & therefore they most humbly pray that they may be from thence dismissed with theire reasonable Cost*es* & Charges in this Cause most wrongfully susteyned./

Viuian

[3]

REPLICATION.

xxij° die Maij Anno R*egni* R*egis* Jacobj Angl*iae* ffr*anciae* et Hib*er*niae Octavo et Scotiae xliij°

The Replicac*i*on of Robt Keysar Compla*i*n*an*te to the ioynte and seu*er*all Answeres of Richard Burbage, Cuth-b*er*te Burbage John Hem*m*inges & Henry Condell def^tes^./

This Compl*ainan*t doth and will averr and maintaine his said Bill of Compl*ain*t, and that the matt^rs^ theirin alleadged are not p*re*-

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ferred against them or against any of them for molestacion and vexacion sake theirby to put them to vnnecessarye and great Charges in suite of Lawe, w^th^out iuste cause as by their said Aunswere ys moste falslye and moste vainlye alleadged, for this Compl*ainan*t ys not soe p*ro*fuze and Lavishe of his expences eyth*er* in Lawe or otherwize, howsoeu*er* the deffend^tes^ by their false and Treacherous dealinge wth him (in this matt*er* wheirof he nowe Complaineth) have exasperated and p*ro*voaked him againste them, as to spend his monye and looze his tyme vpon so perfydeous p*er*sons, vnlesse his Complaynte were iuste and full of Equitye, and soe to be manifested by good p*ro*ffe w^th^out exception, and theirfore as he this Compla*in*ante is well able to maintayne his said Bill of Complainte to be good certaine and sufficyent, and the matt^rs^ theirin alleadged to be iuste and true, and theirfore fitt to be aunswered vnto: Soe on the Contrarye parte doth this Compla*in*ante averr that the defend^tes^ said aunsweres are verye vncertaine, vntrue and insufficyent in the Lawe to be Replyed vnto for manye grosse and apparaunte fault*es* and imp*er*fectiones theyrin moste plainlie appearinge, the advantage and benefitt of Exception wheirof nowe and at all tymes hearaft^r^ to this Compla*in*ante saved for Replicac*i*on theirvnto he saithe in all thinges as in his said Bill of Compl*ain*t he hath saide, wth this allsoe, that the said Compla*in*ante will averr and p*ro*ve, that the saide deft*es* not Contentinge themselves wth abuseinge him by their encouragm^tes^ to p*ro*ceede wth their Bargaine in the said Bill of Compl*ain*t menc*i*oned, wth the said John Marston, and soe to paye his said hundred pounde for the p*ar*ticulars in the said Bill likewize menc*i*oned wch they secretlye mente and intended that he this Compl*ainan*t should never enioye, but be by their fraude vtterlie defeated both of monye and Bargaine as much as in them laye, but wth an inveterate and increasinge mallice towards him this Compl*ainan*t, they the said defend^tes^ intendinge their vttermoste skill and power to Supplante this Compl*ainan*t from havinge anye Com*m*erce or deallinge in anye matt^rs^ of playes or enterludes, did aft^r^ such tyme as they had entred vpon the said howse and goodes for wch the Compla*in*ante had payde as affore-

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said, receiue the said Evans into the said howse wheir they keep him secrett from this Complainant, & so devide & share the said goodes & profittes amonge themselves, to the exceedinge losse and hindrance of this Complainant and havinge theirby fraudulentlie disapointed this Complainant both of howse, goodes, and all his iust and rightfull profitt to have beene made theirby, then allsoe did they in furthr Testimonye of their mallice privatelye Contract wth the owners of all the private playe howses wthin the cittye of London for one whole yeare, and for the same did satisfye and paye a dead rente to the owners theirof, to their owne great losse and hinderance, intending nothinge theirby but the advancemt of their exceadinge mallice to this Complainante and his vtter overthrowe, soe farr forthe as by any possibillitye laye in their power, and by that meanes did exceedinglie hinder this Complainant who all that tyme had a Companye of the moste exparte and skillfull actors wthin the Realme of England to the number of eighteane or Twentye persons all or moste of them trayned vp in that service, in the raigne of the late Queene Elizabeth for Ten yeares togeathr and aftrwardes preferred into her maties service to be the Chilldren of her Revells by a patent from his moste excellent Matie, but kept and mainteyned at the Costes and Charges of this Complainante vntill nowe by the malitious practizes of the defendtes as afforesaid, they are enforced to be dispersed and turned awaye to the abundante hurte of the said young men, the disapointinge of her Maties said service, and to the losse and hinderance of this Complainante at leaste of one Thousand poundes All wch thinges beinge advisedlie considered and Compared togeather, this Complainant doubteth not, but this Courte will theirof take hoble and iuste consideracion for this Complainantes releife againste the malitious enterprises and iniuryous oppressions to him offered by the said defendtes: Wthout that that the said defendtes or any of them were or is ignorant that the said Henrye Evans in the Bill and Aunswere mencioned, did grant all or any parte of the Tearme in the Bill mencioned to the said John Marston for good and valuable Consideracion, or for any Consideracion at all, or were doubtfull whether the said John Marston by force of any graunte from the

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said Henrye Evans did enter vpon the premisses, as by their said Aunswrs they doe moste vntrulye pretend: And wthout that, that the said defendtes or any of them were ignorant that the said John Marston had any such or any parte att all of in or to the said howse or Roome in the Bill mencioned, or of in or to anye the goodes, apparrell for players, propertyes playbookes and other thinges as by their said aunswers they doe moste falslye and subtillye pretend, And wthout that that this Complainante did not repaire and Come vnto the said defendtes, and acquainte and tell them that he had Concluded and agreed wth the said John Marston for a full Sixt parte in the premisses and that he had or was presentlie to paye to the said John Marston one hundred poundes for the same, and that theirvpon they did not make any such promisse or Replye, as they the said deftes in their said Aunswrs have moste falslye and vntrulye deposed, And wthout that that the said deftes did not then offerr to give ffower hundred pounde to this Complainant, or that they did not advise and encourage this Complainant to paye the said hundred pounde to Marston as afforesaid, as by their said aunswers ys moste vntrulie alleadged: And wthout that that the Surrender made by the said Evans to him the said Burbage, was trulye and Bona fide in respect of any the pretences and probable shewes in the said aunswers mencioned, but onlye of mallice and purpose to defraude deceive and disapointe this Complainante of his said Bargaine theirin, and to the verye end that he might be Cozzined of his said hundred pounde, soe farr forth as theire mallice and faithlesse deallinge could helpe and enduce theirvnto: And wthout that that they the said deftes or some of them have not since the paymt of the said hundred poundes to the said Evans, and since the promisse made by the deftes or some of them to this Complainant, and their encouragemt by them vsed for his this Compltes proceadinge and Concludinge in the said Bargaine as afforesaid, have not entermedled wth, had enioyed or received any the goodes or apparell in the Bill mencioned, or Converted the same or anye parte theirof to their or any of their vse or vses, as by the said deftes ys moste falslye denyed: And wthout that that any other matter or thinge ma-

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teryall or effectuall in Lawe to be Replyed vnto in the said def^tes aunsweres Contained and not hearin sufficyentlie Replyed vnto Confessed and avoyded Traverssed or denyed ys true: All wch matt^rs this Compl*ainan*t ys reddye to averr and p*ro*ve as this ho^ble Courte shall awarde and prayeth as before in his said Bill of Compl*ain*t he hath prayed././

Raphe Wilbraham.

[4]

REJOINDER.

xix° die Junij Anno R*e*gni R*egis* Jacobi Angli*ae* ffr*anciae* et hib*erniae* octauo et Scoti*ae* xliij°

The Reioynder of Richard Burbage Cuthbert Burbage John Heminges and Henry Condell defend^tes to the Replication of Robert Keysar Comp^lt./

The said defend^tes for Reioynder vnto the said Comp^ltes Replication say and each of them for and by himselfe sayth in all and euery thinge and thing*es* as in their said Aunsweres they haue sayed And doe and will averre iustefy mainteyne and proue the same and all and euery thinge and thing*es* clause sentence Article and allegac*i*on therein conteined to be good iuste and true certeine and sufficient in the lawe to be replyed vnto in such sorte manner and forme as the same be therein most truely sett forth and declared And these defend^tes further saye and each of them for and by himselfe sayth that the said Replication of the said Comp^lt is very incerteine, scandalous, vntrue and insufficiente in the lawe to be reioyned vnto for many apparant faltes imp*er*fections slaunders and absurdeties therein conteined And that the same is so made and contriued of meere malice and spleene by the said Comp^lt for the causes in the said aunswere expressed. And to the ende to giue some Cullo^r or rather shaddowe for the mayntenaunce of the said Comp^ltes bill, without iust Cause in this hono*ra*ble Co^rt to the vniust scandall and vexac*i*on of these defend^tes as may appeere ffor that the said Comp^ltes Bill and the matters for which he therein complayneth and for which he

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principally seeketh to be releeved in this ho: Cort Consisteth Cheifely in theise two partes ffirst to obteine an interest in and to one sixt parte of the said playe house or great Roame & galleries vsed for playeinge in the said Compltes bill mencioned wch as the said Complt suggesteth he bought of one John Marston gent in the bill named which Marston as allsoe the said Complt (though vntruly) suggesteth had the same passed vnto him from Henry Evans in the said bill allsoe mencioned Vnto wch said first parte these deftes & euerye of them for & by himselfe sayeth That the said Henry Evans neuer graunted assigned or sett ouer any such estate or terme at all of in or vnto the said howse Roome or galleries vnto the said John Marston as in and by the said bill of Complt is supposed or any other estate or terme of in or vnto the said howse Roome or galleries neither could he soe haue done if he would but the same was & would haue bene presently voide for that as these deftes by theire learned Counsell are enformed he the said Henry Evans was restrained in & by his said lease had from this deft Richard Burbage from grauntinge assigneinge or puttinge away the premisses or any parte thereof for any terme whatsoeuer or vnto any person whatsoeuer Neyther did the said Marston as these deftes are Credibly enformed & doe verely beleeve to be true sell graunte or assigne any parte at all in the said howse Roome or galleries vnto the said Complt Neyther is there any mencion at all made thereof in any deede or writinge made or passed from the said Marston vnto the said Complt as these deftes are credibly enformed and doe verely beleeve to be true So as then for the said first & most principall parte of the said Bill the said Complt hath noe iust Cause to Clamor scandalize or Complayne against them these deftes. And as touchinge the Second Mayne parte of the said Compltes bill of Complt by which he allsoe Claymeth to haue from these deftes one full sixt parte of the Apparell goodes playebookes properties for playes & other like thinges Complayned of in the said Compltes bill these deftes saye & each of them for & by himselfe sayth that they nor any of them now haue or at any tyme had any parte or porcion of the said goodes apparell playe bookes properties & other like thinges

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mencioned in the said Bill of Compl^t^ nether did they or any of them euer meddle or haue to doe wth them or clayme or haue any interest vse or p*roper*ty of in or to them or anie of them But these def^tes^ Confesse that they haue heard that they are in the keepinge of the said Henry Evans who hath caused the same to be appraised by honest & indifferent men & hath made & taken a true Inventary of them as these def^tes^ haue likewise heard accordinge wherevnto he allwaies was & yet is ready to deliu*er* such p*ar*te & porc*i*on thereof vnto the said Compl^t^ as his p*ar*te shall or may amount vnto By both wch said p*ar*t*es* of the said Compl^tes^ bill the malice Idle humo^r^ & causeles vexac*i*on togeather wth the slendernes of cause & malicious spleene of the said Compl^t^ towardc*es* the said def^tes^ doe most Clearely declare & shewe themselues And these def^tes^ further say & each of them for & by himselfe sayth vnder favo^r^ of this ho: Co^rt^ that they much m*ar*vaile that the said Compl^t^ should desire soe apparently to sett forth his folly on Recorde as to charge these def^tes^ in & by his said Replication with malice towardc*es* him in Contractinge priuately wth the owners of all the private playehouses within the Citty of London for one whole yeare & for the same to paye a dead rent to the owners thereof to these def^tes^ owne great losse & hinderance But to the intente onely thereby to aduance theire malice & to ou*er*throwe the said Compl^t^ onely soe farre forth as by anie possibility laie in theire power: When as the said Compl^t^ might in truth thereby if the said suggestion were true be p*er*fectly p*er*swaded & assured that these def^tes^ should be not onely malicious as he the said Compl^t^ most iniuriously suggesteth but allso malicious fooles if to doe the Compl^t^ a little hurt if they might which allsoe must needes be vnc*er*teyne to them they the said def^tes^ should doe themselues a farre greater & more c*er*teine losse And when as allsoe the Contracte made with the owners of the said private playe howses if any such were hath allwaies bine soe farre from the ou*er*throwe hindrance or losse of the said Compl^t^ that the same hath allwayes bine & yet is aswell to & for the vse benefytte & p*ro*fitte of the said Compl^t^ himselfe & his p*ar*tners according to the said Compl^tes^ p*ar*te & rate as to the benefytt*es* of these

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defendᵗᵉˢ or any of them accordinge to their seuerall p*ar*tes & rates as these defᵗᵉˢ haue credibly heard & doe verely beleeue ffor these defᵗᵉˢ saye & each of them for & by himselfe sayth that there beinge as these defᵗᵉˢ verely thinke but onely three private playe howses in the Citty of London thone of wᶜʰ beinge in the Blacke fryars & in the hand*es* of these defᵗᵉˢ or of theire assignes One other beinge in the white ffryers in the hand*es* or occupac*i*on of the said Compˡᵗ himselfe his p*ar*tners or assignes & the third neere Sᵗ Pawles Church then beinge in the hand*es* of one Mʳ Pierce But then vnvsed for a playe howse One Mʳ Roseter a p*ar*tner of the said Compˡᵗˢ delt for & Compounded wᵗʰ the said Mʳ Pierce to the onely benefytt of him the said Roseter the now Compˡᵗ the rest of theire p*ar*tners & Company (& without the preuetie knowledge or Consent of these defᵗᵉˢ or any of them & that thereby they the said Compˡᵗ & the said Roseter & their p*ar*tners & company might aduance theire gaines & p*ro*fitt to be had & made in theire said howse in the white ffryers That there might be a Cessation of playeinge & playes to be acted in the said howse neere Sᵗ Paules Church aforesaid for wᶜʰ the said Roceter Compounded with the said Pierce to giue him the said Pierce twenty pound*es* p*er* Ann*um* But these defᵗᵉˢ afterward*es* Cominge to playe at their said howse in the Blacke ffryers And the said Roceter p*er*ceyvinge that the benefytt of the said Cessation of playes at Powles did or was likely to turne aswell to the benefytt of these defᵗᵉˢ and theire Companie as to the benefytt of the said Compˡᵗ the said Roceter & the rest of theire Companie & yett that the whole matter of Charge for payment of the said twenty pound*es* p*er* Ann*um* was of necessety to lye onely on the said Compˡᵗ the said Roceter & the rest of their Compaine he the said Roceter came vnto these defᵗᵉˢ or some of them & intreated them that for the ease & benefytt of the said Compˡᵗ & his Company & p*ar*tners who finde themselues thereby ou*er*charged & agreeued they the said defᵗᵉˢ haueinge as he alleadged as great benefytt as themselues & yett were bound to nothinge would neuertheles be content to beare & paye one halfe of the Charge of the said rent of twenty pound*es* p*er* Ann*um* wherevnto these defᵗᵉˢ in all loue & aswell for the benefytt of the

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said Compˡᵗ accordinge to his parte as of any other person or persons willingly did yeeld & accordingly haue payed there parte of the said rent wherein alsoe the mallice & ingratitude of the said Compˡᵗ is most perspicuous & plaine whoe Canne be Contented to receaue dayly benefytt not onely by the Cessation of the playes in the said howse neere Powles But allsoe out of these defᵗᵉˢ purses in ready money & yet cannot bridle his envye toward these defᵗᵉˢ But ceaseth not most vnchristianlike to charge them wᵗʰ falsehood Cosenage treachery perfidiousnes mallice fraude practize to the ouerthrowinge of the Compˡᵗᵉˢ estate iniurious oppressions & many other lewde & slaunderous supposalls whereas in trueth & as by the premisses plainely may appeere he the said Compˡᵗ hath no iust cause of suite much lesse anie cause at all to vse or sett forth anie such scandalous & vile speeches against these defᵗᵉˢ or any of them as in & by the said Compˡᵗᵉˢ bill & Replication are sett forth vttered & declared without that that these defᵗᵉˢ or any of them haue or did at any tyme receaue or keepe the said Evans secreatt from the said Compˡᵗ & soe devide & share the said goodes and profyttes amongst themselues as in & by the said Replication is most vntruly surmised. But rather to the contrary these defᵗᵉˢ verely thinke that the said Compˡᵗ surceaseth & in truth neuer meant to proceede against the said Evans for feare least that he knoweinge the truth of all the said Compˡᵗᵉˢ vntruthes should discouer more then the Compˡᵗ would willingly haue knowen And yett the Compˡᵗ by incertinge his name into the said bill of Compˡᵗ thinketh to take awaie the said Evans his testimony from these defᵗᵉˢ wᶜʰ these defᵗᵉˢ hope vnderˢ fauorˢ of this ho: Coʳᵗ shall not be permitted And without that that the said Compˡᵗ had at any time to these defᵗᵉˢ knowledge any such companie of the most expert & skillfull Actoʳˢ within the Realme of England to the nomber of eighteene or twentie persons kept & mayneteyned at the Costes & Charges of the Compˡᵗ Or that they were disperced by the maliceous practizes of these defᵗᵉˢ as in & by the said Replication is surmised ffor that these defᵗᵉˢ haue heard it credibly reported & doe verely beleeue it to be true that those Actoʳˢ wᶜʰ he the said Compˡᵗ had & kept allthough none such eyther of

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qualety or nomber as in & by the said Replication is surmised were disperced & driven each of them to provide for himselfe by reason that the playes ceasinge in the Citty of London either through sicknes or for some other cause he the said Comp^lt^ was noe longer able to mayneteyne them togeither wch ought by noe meanes for the reasons aboue declared to be imputed vnto anie falt in these def^tes^ And without that that the said Comp^lt^ hath lost by the dispersinge of the said Companie at the least one thousand poundes As in and by the said Replication is most vntruely & vaineglori-ously surmised onely to raise the Credditt of his estate wch these def^tes^ verely thinke was neuer soe good as to be able to disburse so great a stocke as could haue brought him in soe great a benefitt. And without that that any other matter thinge or thinges clause sentence article or allegacion in the said Replication Conteined specified or declared materiall or effectuall in the lawe to be Reioyned vnto by these defend^tes^ & not heere in this Reioynder sufficiently reioyned vnto Confessed & avoyded trauersed or denied is true All which matters & thinges these def^tes^ are ready to auer & prove as this h: Co^rt^ shall award & therefore they the said def^tes^ pray as before in theire said aunswere they haue prayed./

Viuian

[5]

Court of Requests, Note Book, 6–8 James I (Miscellaneous Books, 152) fol. 260.

[The Clerk's minute book of the Court's orders and decrees, recorded in a rapid and difficult modified Gothic hand as a memorandum of the Court's oral decisions and directions.]

Termino Paschae Anno Regni Regis Jacobi Angliae ffranciae et hiberniae 8° et Scotiae 43°/ viz

Monday the xxj^th^ day of Maij and the last day of this present Terme/

Robt Keysar vs Richard Burbage et al the def^tes^ vppon notice texamyne their witnesses that the cause may come to hearinge

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the next terme, Yf the def^tes the first of the next terme shewe not cause Mr Wilbraham *counsel* &c/

[6]

Court of Requests, Decrees and Orders, Easter, 8 James I (Miscellaneous Books, 25) p. 164.

[The final form of the Court's decrees and orders, carefully written out by the clerk from memoranda hastily taken down in the preceding "Note Books."]

21° Maij A° 8° et 43°/.

Keysar Burbage In the cause at the sute of Robt Keysar p*laintiff* against Richard Burbage & others Def^tes vpon the mocion of m^r Wilbraham of counsaill wth the saide compl^t yt is ordered that the said def^tes having convenient notice of this order shall at their p*er*ills examine all such witnesses as they intend to vse in this cause that the matter may come to hearing in this court the next terme, if they the said def^tes shall not vpon the first day of next terme shewe sufficient cause to the contrary./

[7]

Court of Requests, Note Book, 6–8 James I (Miscellaneous Books, 152) fol. 264.

[The Clerk's minute of the Court's order.]

Termino Sanctae Trinit*atis* Anno Regni Regis Jacobi Angliae ffranciae et hib*er*niae Octavo et Scotiae xliij^tio/ viz

Saterday the ix^th of June

Robt Keyser vrs Cuthbert Burbage et al make Affid*avit* of necessitie of witnesses settinge downe their names and that their desire of further tyme is not for delay shall haue day to examyn till the first of the next terme and pub*lication* the sixth of the same notw^thstanding former order. Jo: Walter *counsel* def^tes in p*rese*nce of m^r Wilbraham

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[8]

Court of Requests, Decrees and Orders, Trinity Term, 8 James I (Miscellaneous Books, 25) p. 232.

[The Court's order, carefully written out by the Clerk in full from the preceding minute.]

Termino Trinitatis Anno *Regni Regis* Jacobi octavo.

Nono die Junij A° *praedicto* [=A° 8° et 43°]./

Keysar Burbage Towching the cause at the sute of Robt Keysar compl^t^ against Cuthbert Burbage and others def^tes^ vpon the mocion of Mr John Walter of counsaill wth the said def^tes^ yt is ordered in *prese*nce of m^r^ Wilbraham of the pl^tes^ counsaill (any form*er* order notw^th^-standing) that the def^tes^ vpon Affid*avit* to be made that they haue materiall witnesses texamine in this cause setting downe theire names and dwelling places, And that theire desire of further tyme texamine them is not for any wilfull delay to the cause shall haue day texamine theire said witnesses vntill the sixt day of the next terme/ And then publicacion shalbe in the same cause graunted & not before./

[9]

Court of Requests, Affidavits, 6–9 James I (Miscellaneous Books, 127.)

[Cuthbert Burbage's Affidavit.]

Termino Trinit*atis* A° *Regni Regis* Jacobi Angliae ffr*anciae* et hib*erniae* octavo et Scotiae xliij° –/ *1610.*

xviij° die Junij A° etc 8° et 43°–/

Keysar Burbage Cuthbert Burbage of the p*a*rish of St Leonard*es* Shorditche in the countie of Midd*lesex* gent sworne sayeth that hee & the rest of the def^tes^ in this ho: Court at the sute of Rob*er*t Keysar haue materiall witnesses to examine in the said cause, And that the said def^tes^ doe not nor have desyred any further tyme to examine their said witnesses for any wilfull delay to the said cause, And

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further that such witnesses as they nowe intend to examine are theise whose names followe that is to say John Marston of Barford in the county of wiltes clerk, Henry Evans of the Blackfryers in London gent, his wief nowe not in London, Nathaniell ffeilde John Vnderwood, William Ostler, and [William] Baxstead of London gent, Phillip Roceter of the whitefryers London gent, & margaret Hawkins of London widowe—/

[10-18]

[It is unfortunate that the depositions of the nine persons mentioned in Cuthbert Burbage's affidavit as material witnesses are wanting. If these depositions existed, they would reveal valuable data in the history of the Blackfriars, with which most of the persons named had been intimately associated for ten to twelve years, since the opening of that theatre in 1597.

But it is evident that these witnesses were never examined. If they had been, their names would be recorded in the Court's Witness Book. No such list is found there. Besides, although we have examined all the uncalendared records of the Court of Requests, even the mouldered and crumbling scraps, of the reigns of Elizabeth, James I, and Charles I, we find no trace of depositions by these witnesses in this case. Cuthbert Burbage's affidavit is the last record in the chronology. It seems likely that the stubborn and long-fought case was finally settled out of court, before it came time to examine these witnesses and proceed in the usual manner to trial and decree. This explains why the Court's records end here.]

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